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Conspectus of Families of Vascular Plants represented in the Flora of New South Wales

(The account of each family, or consecutive group of families as issued, will appear with separate pagination; the names of those families that have been published to date are in italics.)

GYMNOSPERMACEAE

- | | | | |
|---|----------------------|---|---------------------|
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ANGIOSPERMACEAE—MONOCOTYLEDONES

- | | | | |
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The Orchids of New South
Wales. 1943. Facsimile edition
with Supplement by D. J.
McGillivray. 1969.</i> |
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FLORA OF NEW SOUTH WALES

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'Flora of New South Wales'. Any work of this scope now in
preparation will be published in our journal Telopea.

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Sydney

No. 101. FABACEAE, PART 2

By

ALMA T. LEE AND JOY THOMPSON

101. FABACEAE Part 2*

By Alma T. Lee and Joy Thompson†

This section of the Flora of New South Wales deals with those genera placed in the Tribe Genisteae (Adans.) Benth. by Bentham in *Flora Australiensis* 2 (1864), and included in Thompson's key to Fabaceae (as Papilionaceac) Part 1 as genera 19–29 without tribal divisions.

Bentham's classification of the legumes has proved so efficacious that it has suffered little real change in more than a century, and the problems relative to his Genisteae which Bentham himself pointed out, did not invalidate Australian taxonomic work which was then in its early stages.

Recently however, a comprehensive survey of this group by R. M. Polhill (1976) has brought added information and a reassessment of the diagnostic characters and relationships of the genera. In place of the old Genisteae, Polhill found four regional tribes, each exhibiting an individual array of characters together with the monadelphous androecium which had formerly been held to unite them. Within these arrays of characters are some found only in genera of other parts of the Family *in that region*, thus pointing to a polyphyletic origin for Bentham's Genisteae.

In particular, Polhill's investigation had two broad implications for the present work: it recognized a distinct division within his Australian regional tribe, and it revealed a particularly close relationship between some of the genera of that tribe with the Mirbelieae, the Australian free-stamened papilionoids. The two divisions comprised (a) genera with almost entirely temperate distribution (*Bossiaea*, *Platyllobium*, *Goodia*, *Aenictophyton*, *Ptychosema* and *Muelleranthus*), and (b) genera with tropical representatives (*Lamprolobium*, *Plagiocarpus*, *Templetonia* and *Hovea*). The morphological differences between (a) and (b) were accepted as variations to be accommodated within one tribe, the Bossiaeae.

More recently still, however, the International Legume Conference held at Kew in 1978 has brought forward evidence that a more critical assessment of the Australian regional tribe is necessary (Polhill & Raven, 1981). Investigations in several fields not brought to bear on taxonomy in earlier times now appear pertinent to the present considerations. The evidence points strongly to a more basic division between Polhill's two groups of genera and supports their separation at tribal level, the "Bossiaeae group" following easily from the free-stamened Mirbelieae, the "Templetonia group" showing their closest relationships with genera outside Australia. Bentham had in fact referred *Lamprolobium* (only) to such an affinity when he placed it in the tribe Brongniartiaeae, but the perplexing distribution of the tribe's genera, in Australia, and in South/Central America, has discouraged botanists from accepting that placement. While there are many gaps indeed in our

*follows publication (as Papilionaceac) by Joy Thompson in *Contr. New South Wales Natl. Herb. Fl. Ser. No. 101, Part 1* (1961).

†both of National Herbarium of New South Wales, Royal Botanic Gardens, Sydney, Australia 2000. Manuscript prepared by Thompson in 1958 has been edited or emended in varying degree by Lee, as indicated by the authorship given for these genera, Nos. 19, 21 and 22; genera 23–29 by Lee. Both authors have collaborated in the final preparation of the typescript.

knowledge of the *Templetonia* group, evidence from the International Conference has brought cogent support for its tribal separation from the *Bossiaeae* group. From this starting point, even the improbable distribution of these genera endorses their position in *Brongniartieae*, though this was not the conclusion at the Conference itself (see L. A. S. Johnson, Review of "Advances in Legume Systematics" [the Proceedings of the International Legume Conference at Kew, 1978], in *Science* 216: 1402–1403).

All these considerations have led us to an arrangement of genera in the present work which differs slightly from each of those published previously.

Thus the "*Bossiaeae* group" follows immediately on the Mirbelioid genera treated in Part 1 of this Flora by Thompson (1961), in the order concluded by Polhill. Reasons have already been presented for the removal of *Goodia* and *Ptychosema* (and *Muelleranthus* which post-dated Flora Australiensis) from Bentham's *Galegeae* to *Bossiaeae* (Lee 1973, Polhill 1976), though the last two genera are still inadequately known. The "*Templetonia* group" follows, distanced from Mirbeliae and preceding the other regional tribes of Polhill, *Crotalarieae* and *Genisteae sens. str.* This position implies tacit recognition of its affinities with *Brongniartieae*.

New South Wales has no naturalized representatives of the Tribe Liparieae (South African regional component of the old *Genisteae*), and only one genus of the third tribe, *Crotalarieae* (N. and E. Africa — W. Asia region), of which only a few species of *Crotalaria* are endemic. Of the fourth component tribe, *Genisteae sens. str.* (north temperate region), the New South Wales representatives are all introduced, and this brings some contentious taxonomy to our door, since theirs are among the most investigated generic boundaries in Fabaceae, and their nomenclature is correspondingly complicated.

Options for the treatment of taxa in *Genisteae sens. str.* at the present time seem to have narrowed to either that adopted in *Flora Europaea* (Tutin et al., 1968), or the very similar but slightly more consistent system which emerged from Polhill's research (Polhill, 1976). Because of the very broad range of observations on which it is based, and because it offers greater nomenclatural stability for the future, the latter treatment, with its nomenclature, is adopted here.

AMENDMENTS TO GENERIC KEY

The key originally published by Thompson (1961) for all the genera of Fabaceae in New South Wales now requires some alteration, by reason of changed circumscription of some genera, and by addition of others†. The accompanying new

† As well as the above-mentioned changes, incorporation of the flora of Lord Howe Island in that of New South Wales requires the addition of another genus, *Carmichaelia*, to the key. The characters of *Carmichaelia* will bring it to lead 27* in the published key, and it can then be immediately separated off as follows:

"27.* Stamens diadelphous or almost so (9+1 or 5+5)."

- 27a. Fruit with a persistent replum from which the valves fall away; in the only species in the area (Lord Howe Is.), the single seed suspended on a long funicle within the replum; an open shrub mostly 1.5–3 m high, the branches striate, sometimes leafless, the leaves (1–) 3 (–5)-foliolate *Carmichaelia*.

27a.* Fruit otherwise; plants of diverse habit and foliage.

50. Leaves simple or of 1–3 leaflets, occasionally of 5..."

key replacees that published earlier between leads 28 and 28*, as follows:

28. Pod dehiscent.
29. Anthers uniform, dorsifixed ("versatile").
30. Seeds with a conspicuous hooded aril on the longer side; stamens in a sheath split along the upper side; anthers all dorsifixed with a broad connective showing as a (brown, dried) band between the anther cells.
31. Leaves simple, 1-foliolate, or absent (reduced to small scales on cladodes); flowers axillary.
32. Pod not so winged, the valves not or scarcely revolute *Bossiaea* 19.
- 32.* Pod winged along the upper suture, the valves strongly revolute .. *Platylobium* 20.
- 31.* Leaves pinnately 3-foliolate. Flowers in terminal inflorescences *Goodia* 21.
- 30.* Seeds usually exarillate, occasionally with a small aril; anther connective not conspicuous except moderately so in *Muelleranthus* and *Ptychosema*; stamens all joined in a sheath split along the upper side, or the vexillar stamen free, partly free, or erratically free.
33. Herbs or small (in the area) shrubs, sometimes prostrate or twining.
34. Pod not winged near the upper suture.
35. Bracteoles present.
36. Flowers solitary or few, terminal or leaf-opposed; stamens in sheath split along the upper side; leaves trifoliolate or pinnate; stems not twining.
37. Leaves with 5 or more leaflets; stems ascending or erect *Ptychosema* 22.
- 37.* Leaves digitately 3-foliolate; stems prostrate *Muelleranthus* 23.
- 36.* Flowers in axillary racemes; vexillar stamen free, the others joined; leaflets 3; stems usually twining *Glycine* 60.
- 35.* Bracteoles absent..... *Tephrosia* 38.
- 34.* Pod with a prominent rib or wing near the upper suture. (Seeds with a linear hilum and a small persistent extension from a rim-aril)..... *Canavalia* 66.
- 33.* Trees, woody shrubs or tall climbers.
38. Leaflets 5 or more; flowers pink, white, blue or violet *Millettia* 39.
- 38.* Leaflets 3; flowers red or orange..... *Erythrina* 63.
- 29.* Anthers dimorphic, basifixed alternating with dorsifixed, and usually longer and shorter respectively.
39. Filaments all joined in a sheath split above (at least at the base).
40. Keel obtuse though sometimes long and narrow; seeds usually with a conspicuous aril; flower colour various.
41. Flowers with yellow, red and/or brown petals; leaves simple, 1-foliolate, or reduced to scales, rarely pinnate *Templetonia* 24.
- 41.* Flowers blue to purple; leaves simple..... *Hovea* 25.
- 40.* Keel beaked or at least acute; in species of the area flowers yellow and seeds exarillate
- *Crotalaria* 26.
- 39.* Filaments all joined in a closed tube.
42. Leaves digitate with at least 5 leaflets..... *Lupinus* 27.
- 42.* Leaves simple, 1- or 3-foliolate, or reduced to scales or modified stems.
43. Plants of diverse habit but not (in species of the area) spinous.
44. Style upcurved within the proximal $\frac{1}{4}$ of its length, the keel curved near its middle, its length <2.5 times its breadth; upper calyx lobes $\frac{1}{3}$ or less of the total calyx length *Cytisus* 28.
- 44.* Style upcurved in the distal $\frac{1}{4}$ of its length, the keel nearly straight along its lower edge, its length >2.5 times its breadth; upper calyx lobes $>\frac{1}{3}$ total calyx length *Genista* 28a.
- 43.* Plants very spinous, the leaves reduced to spinous phyllodes, the modified branches spine-tipped..... *Ulex* 29.
- 28.* Pod indehiscent, rarely tardily dehiscent and then covered with prickles.

19. BOSSIAEA Vent.†

Jard. Cels. 1: 7, t. 7 (1800).

[After Bossieu de la Martiniere, medical officer and botanist on "L'Astrolabe" with the expedition of La Pérouse, shipwrecked near Vanikoro, 1788.]

Literature: Lee (1970, 1973); Polhill (1976); Sands (1975); Thompson (1961); see page 178.

Shrubs, usually erect, sometimes prostrate, the stems terete, flattened, winged or angled, occasionally spinescent, from a woody rootstock. Leaves usually alternate, sometimes opposite, simple, or more commonly unifoliolate on a petiole or pulvinus more or less geniculate at its junction with a minute petiolule; stipules usually small but sometimes conspicuous, scarious, ovate to setaceous; stipellae absent. Flowers solitary or a few together in the axils, or occasionally pseudoracemose by suppression of leaves, on long or short pedicels, the bract interpreted as the uppermost, and markedly the longest, of a series of reddish to brown, ± scarious, distichous scales (? bracts of suppressed flowers), ovate to elliptical in form, subtending the flower on a minute, perceptible or more often suppressed, axillary branch, the lower bracts smaller and more crowded downwards, the bracteoles paired, sometimes unevenly, and inserted on the pedicel, similar in form to the uppermost bract but larger and more cymbiform. Calyx glabrous or pubescent, the two upper lobes usually broader and united higher than the lower three, and with their pointed tips often divergent. Petals usually orange to yellow but often with some parts, especially the keel, dark red to purplish brown, clawed, the standard orbicular or reniform, usually reflexed, the wings narrow, the keel usually broader than the wings and occasionally much shorter or longer than the standard. Stamens 10, all joined in a sheath open on the adaxial (upper) side ‡, the anthers uniform, dorsifixated with a broad, brown connective. Ovary glabrous or pubescent (often only on the sutures), the style slender, glabrous, curved up to a small terminal stigma, the ovules 1–∞. Pod sessile or stipitate, more or less flattened, the upper suture not winged but often thickened, the valves not or only slightly revolute on dehiscence. Seeds with a hooded, cap-like aril, and a rather thin, curved radicle.

A genus of 42 species endemic in Australia, 19 species in New South Wales.

1. Younger branches leafy and never broadly winged, though sometimes obscurely winged or oval in section with old branches sometimes leafless.
2. Leaves opposite, or if alternate then triangular with long fine points; ovary stipitate.
 3. Lamina of the leaflet almost circular; stems very slender, glabrous, often reddish or yellowish..... *B. lenticularis* 1.
 - 3.* Lamina of the leaf (or leaflet) not circular; stems pubescent with appressed or spreading hairs, usually green to brown.
 4. Young stems somewhat flattened, hoary or with a rather sparse pubescence of very short appressed hairs; leaves unifoliolate, regularly opposite, the leaflets more or less narrow-elliptical to narrow-ovate, smooth and reticulate; stipules lanceolate, erect..... *B. kiamensis* 2.
 - 4.* Young stems terete, usually with a rather dense pubescence of relatively long, spreading hairs; leaves apparently simple, opposite or irregular alternate, triangular (in the N.S.W. populations), acuminate, more or less subacute and reticulate; stipules setaceous, spreading *B. cinerea* 3.

† By J. Thompson & A.T. Lee.

‡ In occasional flowers of *B. carinalis* (Queensland) the vexillary stamen free.

- 2.* Leaves alternate (but not triangular with long, fine points); ovary sessile or stipitate.
5. Stems terete or less commonly oval in section, pubescent with appressed, or short and rather stiffly spreading, hairs at least when young though sometimes soon glabrescent.
6. Branches spinescent *B. obcordata* 4.
- 6.* Branches not spinescent.
7. Keel much longer than the other petals, c. 2 cm; ovary stipitate, glabrous, with c. 8 ovules; pod oblong, c. 3 cm long, 1 cm broad, on a stipe c. 1 cm long; an erect shrub to 1.5 m *B. rupicola* 5.
- 7.* Keel similar to the other petals in length, usually \leq 1 cm long; ovary, pod and habit various.
8. Ovary with 1–3 (?–4) ovules, stipitate; pod almost discoid to twice as long as broad, stipitate; mostly erect shrubs 1–2 m or more in height.
9. Ovary densely pubescent, with long hairs persistent though sparser in the fruit; leaflets cordate, obovate or circular, usually white-pubescent below, up to 3 mm in length and often broader than long, the margins usually recurved *B. foliosa* 6.
- 9.* Ovary and pod glabrous; leaflets very broad-ovate to broad-elliptical or almost circular, green on both sides, usually 2.5–5 mm long and not broader than long, the margins flat *B. oligosperma* 7.
- 8.* Ovary with (4–)8 ovules, subsessile; pod at least twice as long as broad, occasionally shortly stipitate; small prostrate or decumbent shrubs.
10. Ovary glabrous, or with some pubescence usually on the apex and margins, the pod glabrous, or occasionally with sparse soft hairs when young; leaf lamina broadest at or below the middle; petiole and pedicel lengths various.
11. Pedicels 4–5 mm long, not exceeding the subtending leaf; leaves cordate at the base, and often obscurely asymmetrical, darker above than below *B. neo-anglica* 8.
- 11.* Pedicels about 8–15 mm long, equalling or often clearly exceeding the subtending leaf, rarely shorter; leaves not distinctly cordate at the base, the surfaces nearly concolorous.
12. Leaves unifoliolate with a minute angled joint at the petiole junction; leaflets often rounded-elliptical and c. 1 cm long, symmetrical at the base; stems all of \pm equal order, usually up to c. 20 cm long *B. prostrata* 9.
- 12.* Leaves apparently simple with a curved, not jointed petiole, often broad-ovate and c. 5 mm long, some at least asymmetric at the base; longer main stems, often > 20 cm long, usually differentiated from shorter laterals *B. buxifolia* 10.
- 10.* Ovary with long, dense hairs, persistent on the pod; leaf lamina broadest above the middle; petioles shorter than the stipules; pedicels usually short, but occasionally up to about 1.5 cm *B. scortechinii* 11.
- 5.* Stems flattened, distinctly so in mature growth but sometimes obscurely on small twigs, usually glabrous or with a few hairs on young growth (sometimes with long, loose, sparse hairs in *B. stephensonii*).
13. Stipules 1 mm or less in length, inconspicuous. Leaflets various but not usually pungent.
14. Leaflets more or less rhombic to obovate, usually less than 1 cm long and less than twice as long as broad, but if narrower and more than twice as long as broad, as in some ssp. *concolor*, then the apex obtuse, truncate or retuse *B. rhombifolia* 12.
- 14.* Leaflets more or less elliptical to ovate, usually more than 1 cm long and more than twice as long as broad with the apex acute. (Juvenile and regrowth foliage may be broader than adult with the leaflets sometimes obtuse, though not retuse.) *B. heterophylla* 13.
- 13.* Stipules often more than 5 mm long, conspicuous; leaflets usually 1–2 cm long, more or less narrow-elliptical, with a usually recurved, often pungent, apex *B. stephensonii* 14.

- 1.* Younger branches both leafless (except for exstipulate scales and some juvenile leaves) and distinctly winged – i.e. cladodes, usually at least 3 mm wide; oldest branches sometimes almost terete.
15. Flowers yellow or orange, less than 1.5 cm long, the keel equal to or shorter than the standard. (Species of tableland and coastal districts.)
 16. Ovules few, the pod to 2.5 cm long with 3–5 seeds; much branched, erect shrubs, the cladodes rigid and narrow (2–3 mm broad) *B. riparia* 15.
 - 16.* Ovules 8 or more, the pod commonly with as many seeds, 3–5 cm long; erect shrubs with few or many branches, the cladodes rigid or lax, narrow (2–4 mm) or broad (to 15 mm or more in breadth).
 17. Bracteoles very readily deciduous, their insertion usually obscured by the uppermost bracts; erect shrubs to 2.5 m in height, often densely branched and with rigid stems, the main cladodes up to 12 mm broad in New South Wales and even broader in Victorian specimens *B. bracteosa* 16.
 - 17.* Bracteoles persistent on the pedicels; erect or decumbent shrubs mostly 1 (–1.5) m in height, the stems rigid or lax, the main cladodes 10 mm or less in breadth.
 18. Flowers 6–10 (–13) mm long; bracteoles inserted at or below the middle of the pedicel, their tips not reaching to the receptacle; ultimate branches of the cladodes often 2–4 mm broad *B. ensata* 17.
 - 18.* Flowers 10–14 mm long; bracteoles inserted at or above the middle of the pedicel, their tips extending to the receptacle; ultimate branches of the cladodes often 4–6 mm broad *B. scolopendria* 18.
- 15.* Flowers red, more than 1.5 cm long, the keel distinctly longer than the standard. (A species of the inland plains) *B. walkeri* 19.

1. *Bossiaeae lenticularis* Sieber ex DC., Prodr. 2: 117 (1825); G. Don, Gen. Hist. Diehl. Pl. 2: 128 (1832); Bentham, Fl. Austral. 2: 157 (1864); Moore & Betche, Handb. Fl. New South Wales: 142 (1893); Maiden & Betche, Census New South Wales Pl.: 104 (1916); Beadle, Evans & Carolin, Handb. Vase. Pl. Sydney Distr.: 253 (1963); Beadle, Evans & Carolin, Fl. Sydney Region: 301 (1972); Jacobs & Pickard, Pl. New South Wales: 118 (1981). — HOLOTYPE: n.v. (G-DC), photo (NSW !); ISOTYPE: Sieber 425 (NSW !); see Lee (1970).

[The name *B. lenticularis* was misapplied by Loddiges, Bot. Cab. 13: t. 1238 (1827), to his illustration of *B. rhombifolia* (ssp. *rhombifolia*) q.v.]

A slender almost completely glabrous shrub of diffuse habit, often 1 m or more in height with very slender terete branches often yellowish or reddish in colour. Leaves unifoliate, opposite, shortly petiolate, the leaflets usually circular, 2–8 mm diam., the apex sometimes broadly acute, the margins entire, recurved or flat, the upper surface darker than the lower. Stipules usually 1 mm or less in length, narrow- to very broad-triangular, dark brown, persistent. Flowers 6–12 mm long, solitary in the axils, on pedicels up to approximately 5 mm in length. Bracts few in the series, less than 1 mm long, acute, dark purplish brown, sometimes with yellow markings when fresh, glabrous, crowded at the apex of a short (to c. 2 mm) branch below the pedicel. Bracteoles paired, up to 1 mm long, elliptical, cymbiform, somewhat variably and unevenly inserted on the attenuated base of the receptacle or on the pedicel but usually distant from the bracts; bracts and bracteoles firm, persistent. Calyx 4–7 mm long, the three lower lobes acute, shorter than the tube, the upper two much broader and longer than the lower, longer than the tube, very obtuse, united for part of their length. Petals approximately equal in length, the standard and wings mostly yellow, the keel dark reddish. Ovary stipitate, glabrous, with about 4 ovules. Pod long-stipitate, glabrous, almost flat, obovate to oblong or narrower, 1–3 cm long. Chromosome number: $n=9$, $2n=18$ (Sands, Proc. Linn. Soc. New South Wales 100 (2): 141 (1975)). Fl.: Aug.–Sept. Fr.: chiefly Nov.–Dec.

DISTRIBUTION: Central Coast and Central Tablelands of New South Wales; often in wet situations.

CENTRAL COAST: Grassy Hill [Colo-Putty road], *Constable NSW 27302*, 9.1948; 1 mile [1.6 km] N. of Colo Heights, *Tindale NSW 48851*, 11.1959; Colo Heights, *Boyd NSW 100994*, 11.1964; Wheelbarrow Ridge road, 2.3 km from Lower Portland towards Colo Heights, *Coveny 9069* & *Hind*, 12.1976; Wisemans Ferry, *Tunbridge NSW 43794*, 9.1920; Canoelands [as Canoe Grounds], Hawkesbury R., *Blakely & Stiress NSW 43792*, 10.1927; near Maroota Trig., *Blakely & Stiress NSW 43793*, 9.1929; South Maroota, *Tindale NSW 52275*, 10.1960; Bowens Ck road (near gorge), *Lovis 242*, 8.1955; Bowens Ck road, c. 1 km from Bilpin, *Coveny 10445*, 9.1979; Glenorie, *Winter NSW 43795*, 6.1927; Port Jackson, *NSW 43802* [before 1913]; Burratorang, *Cambage 2311*, 10.1909; Brimstone Gully, $\frac{1}{2}$ mile [0.8 km] W. of State Coal Mine, *Mitchell 667*, 12.1972; Thirlmere [as Picton] Lakes, *Hamilton NSW 43787*, 10.1911; *Evans NSW 84105*, 12.1962, *McBarron 11903*, 9.1965. CENTRAL TABLELANDS: Tambo Limb Ck, *Constable NSW 27304*, 12.1948; Mt Wilson, *Maiden NSW 43798*, 10.1899; Bowens Ck near Mt Wilson, *Coveny NSW 85256*, 10.1966; Bell road, Mt Wilson, *Johnson NSW 43799*, 9.1949; Newnes Junction, *Hamilton NSW 43790*, 9.1914; Clarence Siding, *Maiden NSW 43800*, 9.1898; Clarencee, $33^{\circ}28'S$, $150^{\circ}14'E$, *Coveny 6324* & *Hind*, 5.1975; Morts Gully, Lithgow, *Boorman NSW 43788*, 10.1914; Bell, in swamp, *Blakely NSW 43801*, 10.1921; about $\frac{1}{4}$ mile [0.4 km] from Bell, *Pearce NSW 52973*, 12.1960; Mt Banks, *Constable 7317*, 1.1967; Mt Tomah, *Maiden NSW 43797*, 11.1898; Mt Charles, Bell-Kurrajong road, *McReadie NSW 84106*, 9.1961; Lawson, *Hamilton NSW 43791*, 10.1898. WITHOUT PRECISE LOCALITY: Nova Hollandia, *Sieber 425* (Type); as *B. rhombifolia*: New South Wales, *Caley*, 1806 [a mixed collection, with *B. neo-anglica*].

2. *Bossiaeaa kiamensis* Benth., Fl. Austral. 2: 158 (1864); Moore & Betehe, Handb. Fl. New South Wales: 142 (1893); Maiden & Betehe, Census New South Wales Pl.: 104 (1916); Beadle, Evans & Carolin, Handb. Vase. Pl. Sydney Distr.: 253 (1963); Beadle, Evans & Carolin, Fl. Sydney Region: 301 (1972); Jacobs & Pickard, Pl. New South Wales: 118 (1981). — HOLOTYPE: n.v. (K); see Lee (1970).

An erect or occasionally prostrate shrub, from less than 1 to more than 2 m high, the stems with a close white pubescence but becoming glabrous, the younger ones somewhat flattened. Leaves unifoliolate, opposite, shortly petiolate and with a distinct dorsal spur, the leaflets ovate to narrow-ovate or elliptical, usually 1–2.5 cm long, the margins entire, flat or recurved, the upper surface darker than the lower, usually glabrous and conspicuously reticulate, the lower sparsely appressed-pubescent or glabrous with the midrib very prominent, the apex acute or obtuse, with a short pungent point. *Stipules* c. 2 mm long, lanceolate, often acuminate, usually erect, dark brown, persistent. *Flowers* 1–1.2 cm long, solitary in the axils, on pedicels usually 5 mm or less in length. *Bracts* several in the series, up to 1 mm long, ovate, crowded in the axil, the lower ones pubescent, the uppermost glabrous with a few marginal hairs, somewhat persistent. *Bracteoles* like the uppermost bract, but paired, eymbiform, on the middle or upper part of the pedicel, occasionally close to the receptacle, persistent. *Calyx* 5–6 mm long, the outer surface glabrous, the three lower lobes acute, shorter than the tube, the upper two shorter or longer than the tube, much broader and longer than the lower, obtuse with a small lateral point, united for part of their length. *Petals* approximately equal in length, the standard yellow with red markings, the wings and keel red. *Ovary* long-stipitate, glabrous, with about 4 ovules. *Pod* long-stipitate, glabrous, almost flat, usually obliquely ovate, 1–2 cm long. *Chromosome number*: $2n=18$ (Sands, Proc. Linn. Soc. New South Wales 100 (2): 141 (1975)). Fl.: Spring, mostly Sept.–Oct. Fr.: Summer.

DISTRIBUTION: Southern part of the Central Coast and Central Tablelands, and northern part of the South Coast and Southern Tablelands of New South Wales; on sandstone soils in both exposed rocky situations and in wet and more sheltered habitats.

CENTRAL COAST: Minnamurra Falls Reserve, *Judd NSW 43817*, 5.1954. SOUTH COAST: Berry Mtn, *Maiden NSW 43819*, 9.1905; c. 2 miles [c. 3 km] N. of Berry, *Rodway NSW 43816*, 8.1949; Turpentine Ra., c. 15 miles [c. 25 km] SW. of Nowra on Nerriga road, *Constable 7441*, 9.1967; Twelve mile road, 5 miles [8 km] NNW. of Conjola, *Floyd NSW 43818*, 8.1952; Gadara Point, Little Forest plateau, c. $35^{\circ}17'S$, $150^{\circ}20'E$, *Olsen 1862*, 2.1974; Top of Table Mtn, W. of Milton, *Cambage 757*, 12.1902. CENTRAL TABLELANDS: Carrington Falls, . . ., *McBarron 9286*, 9.1964, *Constable 4954*, 7.1964; Jamberoo-Carrington Falls road, *Constable NSW 30980*, 1.1955; Belmore Falls, *Rodway NSW 43807*, 10.1918, *McBarron 2425*, 10.1948; near Belmore Falls, *Forsyth NSW 43821*, 10.1900; Barren Grounds Faunal Reserve, *Cladwick NSW 43808*, 10.1956; Fitzroy Falls, *Morris NSW 43820*, 9.1928; Barrengarry

Mtn, Maiden NSW 43823, 9.1905; Morton National Park, at top of Barrengarry Mtn, *Coveny* 5838 & *Armstrong*, 10.1974; Woodhill Bluff, *Rodway* NSW 43806, 9.1930; Gold Gully, Penrose, *Blakely*, *Buckingham & Buckingham* NSW 43824, 11.1939; Penrose, *Constable* NSW 36717, 1.1956; S. of Mt Wombla, *Rodway* NSW 43813, 1.1944. SOUTHERN TABLELANDS: on Nerriga-Sassafras road, c. 8 km NE. of Nerriga, *Briggs* 4344, 8.1971; 2 miles [3 km] NE. of Endrick R., Nerriga-Sassafras road, *Williams* 136, 10.1959; Nerriga, *Gauba* CBG 000845, 10.1951; c. 4 miles [c. 6 km] E. of Nerriga along Braidwood-Nowra road, *Pullen* 4112, 9.1965; Bulee Ridge, E. of Nerriga, *Pullen* 2215, 2234, 9.1960; head of Clyde R. near Sassafras, *Rodway* NSW 43814, 9.1935; Round Hill, 3 miles [5 km] S. of Sassafras, *Constable* NSW 57875, 9.1961; c. 6 miles [c. 10 km] S. of Sassafras above Clyde R. gorge, *Lee* 76, 11.1970; head of Corang R., *Sturges* NSW 43811, 3.1944; between "Wog Wog" Station and Mt Corang . . . 35°17'S. 150°05'E, *Pullen* 4991, 9.1973; gorges of Upper Clyde R., *Rodway* NSW 43815, 9.1937; summit of Mt Currockbilly, *Rodway* 2665, 1.1938; Currockbilly Mtn, *Boorman* NSW 43826, 3.1909, NSW 43828, 11.1915; Currockbilly Mtn, 14 miles [22 km] ENE. of Braidwood, *Constable* 7444, 9.1967; Braidwood, *Fletcher* NSW 43827; Mt Budawang . . . *Constable* 6953, 5.1966, Loane ref. no. 247, 10.1977; Sugar-loaf Mtn, *Boorman* NSW 43810, 9.1915.

3. Bossiaeae cinerea R. Br. in W. T. Aiton, Hortus Kew. edn 2, 4: 268 (1812); Bot Reg.: t. 306 (1818); Candolle, Prodr. 2: 117 (1825); G. Don, Gen. Hist. Dichl. Pl. 2: 128 (1832); J. D. Hooker, Fl. Tasmaniae 1: 95 (1856); F. Mueller, Fragm. 3: 98 (1862); Bentham, Fl. Austral. 2: 160 (1864); Tate, Handb. Fl. Extratrop. South Australia: 65 (1890); Moore & Betche, Handb. Fl. New South Wales: 142 (1893); Rodway, Tasmanian Fl.: 36 (1903); Maiden & Betche, Census New South Wales Pl.: 105 (1916); Williamson in Ewart, Fl. Victoria: 662 (1931); Black, Fl. South Australia edn 2, 2: 445 (1948); Curtis, Stud. Fl. Tasmania 1: 142 (1956); Willis, Handb. Pl. Victoria 2: 280 (1973); Jacobs & Pickard, Pl. New South Wales: 118 (1981). — TYPE (?Holotype, Syntype): n.v. (BM); see Lee (1970).

B. coccinea Bonpl., Descr. pl. rares . . . Malmaison et à Navarre: t. 52 (1816). — TYPE: n.v.; see Lee, l.c.

B. cordifolia Sweet, Fl. Australasica: t. 20 (1827); G. Don, Gen. Hist. Dichl. Pl. 2: 128 and t. 28 (1832). — TYPE: n.v.; see Lee, l.c.

B. tenuicaulis Grah. in Edinburgh New Philos. J. 29: 171 (1840); W. J. Hooker in Bot. Mag.: t. 3895 (1842). — TYPE: n.v.; see Lee, l.c.

A much-branched shrub often up to 1 m, occasionally over 2 m, in height, the stems terete, and pubescent with loosely spreading hairs. Leaves alternate or more commonly opposite to irregularly whorled, unifoliolate with a slender spur up to 1 mm long at the junction of the rachis with a short or negligible petiole, the leaflets usually trullate or triangular to ovate (often narrower in Victoria, Tasmania and South Australia), 5–20 mm long, the margins entire, recurved or revolute, the upper surface darker than the lower, often covered with minute tubercles, usually glabrous, the lower surface pubescent with scattered hairs only on the midrib, the apex acute with a long, straight pungent point, the base rounded or cordate. *Stipules* c. 2 mm long, reddish, setaceous, spreading to reflexed, persistent. *Flowers* 7–12 mm long, solitary in the axils, on filiform pedicels up to 1 cm or more in length. *Bracts* few or several in the series, less than 1 mm long, reddish then dark brown, crowded on a minute branch below the pedicel, pubescent to shortly ciliate, somewhat deciduous. *Bracteoles* paired, up to 1 mm long, almost glabrous, inserted on the upper part of the pedicel, persistent. *Calyx* 3–5 mm long, glabrous outside, the lobes much shorter than the tube, the lower three acute, the upper two much longer and broader than the lower, very obtuse, usually with a small lateral point, united for part of their length. *Petals* of unequal length, the standard red outside, orange within and longer than the orange wings and red keel. *Ovary* stipitate, glabrous, with c. 4 ovules. *Pod* stipitate, glabrous, almost flat, ovate to oblong, 1–2 cm long. Fl.: Spring, mostly Sept. Fr.: late Spring, Oct. (–Jan.).

DISTRIBUTION: In the far South Coast of New South Wales, and in Victoria, Tasmania and South Australia; in coastal sandy heathlands and eucalypt-banksia forest.

SOUTH COAST: 6 km N. of Merimbula, *Crisp* 1930, 1.1976; Merimbula . . . , *Constable* 7428, 5.1967; Merimbula, near aerodrome, *Gordon NSW* 53319, 2.1961, (opposite aerodrome), *Constable* 5494, 11.1964, (sand dunes opposite airport), *Constable* 4319, 8.1963; Pambula-Merimbula, *Boorman NSW* 43672, 8.1915; Pambula, *Forde NSW* 43671, 10.1905; The Pinnacles, Ben Boyd National Park, *Crisp* 1928, 1.1976; track to Womboyn Beach from Womboyn Lake, *Phillips NSW* 101097, 10.1961; Disaster Bay near cliffs, *Constable* NSW 30236, 10.1954.

B. rosmarinifolia Lindl. in Mitchell, Three Exped. 2: 129 (1838) (*B. cinerea* var. [?] *rosmarinifolia* Benth., Fl. Austral. 2: 160 [1864]), known only from the Grampians, Victoria, is obviously related to *B. cinerea* but has not been fully studied. It deserves some nomenclatural recognition of its morphological distinctness either as a species, as in Willis, i.e., or as a geographic race (subspecies) of *B. cinerea*.

4. Bossiaeae obcordata (Vent.) Druce, Rep. Bot. Soc. Exch. Club British Isles, Suppl. 2 for 1916: 610 (1917); Beadle, Evans & Carolin, Fl. Sydney Region: 301 (1972); Willis, Handb. Pl. Victoria 2: 279 (1973); Beadle, Stud. Fl. N.E. New South Wales 3: 392 (1976); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — *Platylobium obcordatum* Vent. (basionym), Jard. Malm.: sub n. 31 (1804). — HOLOTYPE: n.v. (G.), photo (NSW!); see Lee (1970).

Platylobium microphyllum Sims, Bot. Mag. 22: t. 863 (1805). — *Bossiaea microphylla* (Sims) Sm., Trans. Linn. Soc. 9: 303 (1808); R. Brown in W. T. Aiton, Hortus Kew. edn 2, 4: 268 (1812); Loddiges, Bot. Cab. 7: t. 656 (1822); Candolle, Prodr. 2: 117 (1825); G. Don, Gen. Hist. Diehl. Pl. 2: 128 (1832); F. Mueller, Fragm. 3: 99 (1862); Bentham, Fl. Austral. 2: 164 (1864); Moore & Betche, Handb. Fl. New South Wales: 143 (1893); Maiden & Betche, Census New South Wales Pl.: 105 (1916); Williamson in Ewart, Fl. Victoria: 662 (1931); Curtis, Stud. Fl. Tasmania 1: 143 (1956); Beadle, Evans & Carolin, Handb. Vase. Pl. Sydney Distr.: 254 (1963). — TYPE: n.v.; see Lee (1970).

A shrub often reaching 1 m and occasionally 2 m or more in height, the branches spinescent, at least the younger ones somewhat flattened and striate and often pubescent with short, appressed, white hairs. Leaves obscurely unifoliolate, alternate, shortly petiolate, the leaflets glabrous or with a few hairs, broadly ovate to obovate, usually 3–6 mm long, the venation usually conspicuous, the margins entire, flat or recurved, the upper surface darker than the lower, the apex truncate or retuse, often with a small recurved point. Stipules 1–2 mm long, deltoid to narrow-ovate, dark brown. Flowers usually 8–10 mm long, solitary in the axils on pedicels less than 5 mm long. Bracts few in the series, to c. 1 mm long, mostly with some pubescence, crowded in the axil, readily deciduous. Bracteoles paired, often unevenly, longer than the uppermost bract, to 2 mm long, shortly ciliate, their insertion in the lower half of the short pedicel often overlapped by tips of the upper bracts, readily deciduous. Calyx 3–5 mm long, the outer surface glabrous, the lobes much shorter than the tube, the lower three acute, the upper two broader than the lower, obtuse or somewhat acute, united for a short distance at the base. Petals approximately equal in length, all yellow, or commonly the keel and the base of other petals purplish brown. Ovary almost sessile, glabrous, with about 4 ovules. Pod shortly stipitate, glabrous, almost flat, ovate to obovate, 1–2 cm long. Chromosome number: $n=9$, $2n=18$ (Sands, Proc. Linn. Soc. New South Wales 100 (2): 141 (1975)). Fl.: Spring, mostly Sept.–Oct. Fr.: Sept.–Feb.

DISTRIBUTION: From the North Western Slopes and all the Coastal and Tableland subdivisions of New South Wales to similar parts of eastern Victoria; recorded also for Queensland and Tasmania. A common component of the sandstone flora on ridges and slopes of the Sydney area and lower Blue Mountains; in other areas usually on sandstone or other acidic soils.

NORTH COAST: Pacific Highway, 12 miles [19 km] S. of Kempsey, *Coveny* 2151, 9.1969; Paterson, *Rupp* NSW 44010, 8.1925; 2 miles [3 km] W. of Karuah, *Johnson* NSW 44011, 10.1953. CENTRAL COAST:

Howes Mt, *Johnson NSW 44009*, 9.1951; 6 miles [10 km] NW. of Morisset, *Story 6677*, 9.1959; Morisset, *Boorman NSW 44001*, 10.1899; 4 miles [6 km] W. of Doyalson, on Wyee road, *Constable NSW 30949*, 9.1954; Colo Heights, *Tindale NSW 45573*, 8.1958; Gosford, *Parser NSW 44014*, 9.1899; Maroota, *Blakely & Shiress NSW 43980*, 9.1929; South Maroota, *Tindale NSW 52841*, 10.1960; Canoelands [as Canoe Ground], Hawkesbury R., *Blakely & Shiress NSW 43979*, 10.1927; near Kuringai, *Morris NSW 43983*, 9.1924; Hornsby, *Ford NSW 4473*, 10.1947, *Blakely NSW 44003*, 8.1914, *anon. NSW 43995*, 9.1886; Fauleonbridge, *Maiden & Cambage NSW 43993*, 11.1904; Springwood, *Betche NSW 43971*, 9.1889, *Hamilton NSW 43996*, 9.1914; Fletcher *NSW 43994*, 9.1887, *Cross NSW 43998*, 3.1934, *Canfield NSW 43977*, 10.1900; Valley Heights, *Hamilton NSW 43987*, 10.1914; Woodford, *Cheel NSW 43974*, 9.1913; Wahroonga, *Canfield NSW 43984*, 11.1898; opposite St Ives showground, *Tindale NSW 34381*, 9.1961; St Ives, *Blakely & Anderson NSW 44002*, 9.1936; Cumberland State Forest, West Pennant Hills, *Coveny 8630*, 10.1976; Pennant Hills, *Fraser NSW 43999*, 9.1927, *Vickery NSW 43992*, 9.1936; Glenbrook, *Hamilton NSW 43975*, 10.1914; Beecroft, *Carne NSW 43975*, 11.1914; Cheltenham, *Johnson NSW 44000*, 9.1946; Epping, *Ford NSW 4425*, 9.1947; Lane Cove R., *Dixon NSW 43970*, 8.1903; Parramatta, *Caley*, 1799–1810; Port Jackson, *Weber NSW 43982*, 1880; Bents Basin, Nepean R., *Maiden NSW 43972*, 6.1913; Warragamba township, *Mitchell 424*, 8.1966; Warragamba Gorge, $\frac{1}{2}$ mile [0.8 km] from the dam, *Mitchell 428*, 9.1966; Como, *Canfield NSW 43969*, 9.1897; Tonalli Gap to Tonalli R. (3 miles [5 km] W. of Yerranderie), *Johnson NSW 43985*, 10.1951; Thirlmere [as Pieton] Lakes, 5 miles [8 km] SW. of Pieton, *Keats & Coveny 3427*, 12.1970; Stanwell Park, *Canfield NSW 43988*, 12.1896; Little R., Buxton, *Whaite 1083*, 10.1951; Nepean Dam, Bargo, *Constable NSW 43989*, 12.1953; 1 mile [1.6 km] N. of Hilltop, *McBarron 10947*, 8.1965; Cambewarra, *Rodway NSW 44033*, 10.1917; near Bomaderry (on Cambewarra Road), *Rodway 914*, 10.1932; Bomaderry, *Rodway 1947*, 9.1939. SOUTH COAST: Badgerys Crossing to Nowra, *Forsyth & Hamilton NSW 44018*, 9.1899; Nowra, *Rodway NSW 44023*, 8.1915; Nowra Ck, *Rodway NSW 44031*, 12.1916; Corner Block, Junition and Shoalhaven Sts, Nowra, *Rodway NSW 44015*, 1.1928, *NSW 44016*, 8.1928; Woodburn State Forest, S. of Milton, *Small NSW 44022*, 8.1936; Yadboro Ck, near Pigeon House Mtn, *Whaite 3118*, 10.1966; Kioloa State Forest, c. 3 miles [c. 5 km] NW. of Pebbley Beach, *Pullen 4156*, 10.1966; probably from western Benandarah State Forest (Batemans Bay area), *Loane 226*, 1976; 24 miles [38 km] S. of Milton, along Pacific Highway, *Tindale NSW 52200*, 9.1960; ridge NE. of Nerrigundah, *Constable NSW 26535*, 10.1953; W. of Bega, *Mueller 2197*, 10.1953; Bega, *Breakwell NSW 44029*, 12.1913; 1 mile [1.6 km] N. of Merimbula, on Tathra road, *Muir 2469*, 10.1961; Merimbula, *Hoogland 7720*, 10.1960; Twofold Bay, *Lee Simpson NSW 44019*, 10.1927; Womboyn, *Constable NSW 30234*, 10.1954. NORTHERN TABLELANDS: Torrington, *Boorman NSW 44008*, 1.1911, *NSW 44013*, 10.1911; Tungsten, via Deepwater, *Lynchi NSW 44007*, 10.1913; Nandewar Range, NE. of Barraba, *Rupp NSW 44012*, 9.1914. CENTRAL TABLELANDS: N. slope of Mt Coricudgy, *McGillivray & Rodd 110*, 4.1965; Coxs R., *Maiden & Cambage NSW 43973*, 10.1904; Lawson, *Hamilton NSW 43976*, 10.1914; Leura, Mt Hay Road, *Hamilton NSW 43997*, 9.1914; Hilltop, *Cheel NSW 44024*, 12.1912; c. 2 km E. of Mittagong R. on Wollongong–Bowral road, *Powell 101*, 9.1975; Mittagong, *Dixon NSW 43990* s. d., *Burgess B1*, 9.1972; c. 1 mile [c. 1.5 km] S. of Mittagong, *Pullen 2272*, 10.1960; Belmore Falls, Robertson, *McBarron 2389*, 10.1948; Fitzroy Falls [between Nowra and Moss Vale], *Rodway NSW 44020*, 10.1920; Wingello, *Boorman NSW 44028*, 12.1913; Tallong–Wingello, *Moore 2718*, 10.1953; Barbers Ck, *Runsey NSW 44025*, 10.1898. SOUTHERN TABLELANDS: $1\frac{1}{2}$ miles [21.5 km] from Hoskingtown on Braidwood Road, *Moore 1670*, 5.1952; Majors Ck, Braidwood, *Cambage 2092*, 10.1908; base of Jounama Peaks [Bogong Peaks in Bogong Mts, E. of Talbingo], *Althofer 304*, 2.1971. NORTH WESTERN SLOPES: 3.2 km E. of Howell, *Armstrong 688*, 11.1973; Howell, *Hart NSW 44005*, 10.1905, *Munisie NSW 44006*, 10.1913; Gundamulda near Barraba, *Rupp NSW 44004*, 10.1914; Rokey Glen (21 miles [34 km] ENE. of Coonabarabran), *Coveny NSW 131/25*, 4.1970; Warrumbungle Ras, *Joshua NSW 117325*, 9.1969. WITHOUT PRECISE LOCALITY: Sieber 355, Fl. *Novae Holl.*; *McWilliam NSW 43981*; *Dixon NSW 43968*; Iter austral., *Brown NSW 43967*, 1802–5; Waterfall, *Leichhardt NSW 43991*, 8.[184–?].

5. Bossiaea rupicola A. Cunn. ex Benth., Fl. Austral. 2: 162 (1864); F. M. Bailey, Syn. Queensland Fl.: 95 (1893), Queensland Fl. 2: 364 (1900). — ISOTYPE: Cunningham 159 (NSW!).

An erect shrub of about 1.5 m in height, the young stems terete, appressed-pubescent with white hairs but soon glabrescent. Leaves distichous, unifoliolate, on a short petiole about equal to the stipules, the leaflets narrow-ovate, 1–2 cm long, 3–4 mm broad, rather thick (from the fine, irregular wrinkling of almost veinless dried specimens), the apex acute, the base more obtuse; ephemeral pubescence with appressed shining hairs on both surfaces, the margins entire, flat. Stipules about 1 mm long, acuminate, pubescent outside, glabrous and reddish within, the edges rolled back, the tip often hooked or coiled inwards. Flowers borne rather irregularly on the upper part of the branches, c. 2 cm long, solitary in the axils and

on pedicels 3–5 mm long. *Bracts* few in the series, crowded in the axil, obtuse, up to 1 mm long. *Bracteoles* paired, c. 1 mm long, with less pubescence than the bracts, inserted close above them near the base of the pedicel, persistent to the fruiting stage. *Calyx* 5–7 mm long, drying black, obscurely pubescent with rather sparse, appressed hairs, the lobes shorter than the tube, the lower three triangular, the upper two longer and broader, truncate, or very obtuse, joined for most of their length. *Petals* with the standard and wings (from dried specimens) predominantly yellow or orange and much shorter than the dark red keel of c. 2 cm. *Ovary* glabrous, with about 8 ovules; on a distinct stipe c. 5 mm long. *Pod* oblong, sometimes obliquely, on a stipe c. 1 cm long, glabrous. Fl.: late Winter to Spring. Fr.: Sept.

DISTRIBUTION: Known only from the border of New South Wales with Queensland and southeastern Queensland (Mt Greville); in elevated rocky situations in dry sclerophyll forest on the McPherson Ra.

NORTH COAST: Slopes of Mt Lindesay [as 'Lindsay']. *Cunningham* 159.

6. Bossiaea foliosa A. Cunn. in Field, Geogr. Mem. New South Wales: 347 (1825); G. Don, Gen. Hist. Diehl. Pl. 2: 128 (1832); F. Mueller, Hooker's J. Bot. Kew Gard. Mise. 8: 43 (1856); F. Mueller, Fragm. 3: 100 (1862), 9: 45 (1875); Bentham, Fl. Austral. 2: 160 (1864); Moore & Betche, Handb. Fl. New South Wales: 142 (1893); R. T. Baker, Proc. Linn. Soc. New South Wales 24: 438 (1899); Maiden & Betche, Census New South Wales Pl.: 104 (1916); Williamson in Ewart, Fl. Victoria: 662 (1931); Burbidge & Gray, Fl. Austral. Cap. Territory: 214 (1970); Willis, Handb. Pl. Victoria 2: 278 (1973); Jacobs & Piekard, Pl. New South Wales: 119 (1981); Thompson, Telopea 2 (3): 265, 322 (1981). — HOLOTYPE: n.v. (K); ISOTYPE: *Cunningham* 130 (NSW !); see Lee (1970).

B. distichoclada F. Muell., Trans. Phil. Soc. Victoria 1: 39 (1855), Hooker's J. Bot. Kew Gard. Mise. 8: 43 (1856). — SYNTYPES: MEL 20321–20326 !; see Lee, l.e.

An erect shrub usually 1.5 m or less in height (to 4.8 m, see F. Mueller, l.c. [1875]) with terete stems, at least the smaller stems pubescent with dense, short, white hairs. Leaves obscurely unifoliolate, alternate, petiolate, the leaflets more or less transversely elliptical, cordate or obovate, 3 mm or less in length, often folded upwards from the midrib and distichous, the margins entire, usually recurved, the upper surface coriaceous, glabrous and shining, the lower with appressed white silky hairs or rarely glabrous, the apex usually somewhat recurved and often retuse. Stipules usually 1 mm or less in length, broadly ovate, often acuminate, dark brown, scariosus, imbricate at the ends of young branches. Flowers 5–7 mm long, solitary in the axils, the pedicels 2 mm or less. Bracts few in the series, crowded in the axil, up to 2 mm long, broad-ovate to circular, often shortly fringed, deciduous. Bracteoles paired, similar in size and form to the uppermost bract and inserted on the pedicel close above it, readily deciduous. Calyx approximately 3 mm long, pubescent with appressed silky hairs or glabrous, the lobes shorter than the tube, acute, the upper pair broader than the lower three, curved and united for a short distance at the base. Petals almost equal in length and of a uniform, clear yellow. Ovary stipitate, with long, dense ferruginous hairs, the ovules few. Pod on a short slender stipe, pubescent, flat, almost circular, approximately 7 mm in diameter. Chromosome number: $2n = 18$ (Sands, Proc. Linn. Soc. New South Wales 100 (2): 141 (1975)). Fl.: Spring to early Summer, especially Nov. Fr.: Summer, especially Jan.

DISTRIBUTION: Southern half of the Central Tablelands, and Southern Tablelands of New South Wales, at high altitudes up to the treeline; also in the Alps and Eastern Highlands of Victoria; common on hillsides in a variety of (often moist) soils; recorded also, atypically, from or near sphagnum bogs.

CENTRAL TABLELANDS: Mullions Range State Forest, *Constable NSW 48103*, 10.1959, per *Forestry Commission NSW 43411*, 2.1929, *Lane NSW 47745*, 10.1959; Rocky Falls, Mullions Range State Forest, *Constable NSW 48106*, 10.1958; The Mullions Range, 10 km NE. of Mullion Creek railway station, *Coveny 10234*, 10.1978; Sunny Corner, *Boorman NSW 43410*, 11.1899; Bathurst, *Cunningham 130*, 1822, *anon. NSW 43409*; Edith, ? *Blakely*, 11.1899. SOUTHERN TABLELANDS: Burrinjuck near Bowning, *McBarron 5240*, 11.1950; [at several, sometimes specified, points along or near the] Mt Franklin Road, Brindabella Ra. [mostly within the western boundary of A.C.T.]: *Darbyshire 520*, 11.1961, *Moore 2774*, 11.1953, *Gray & Tindale NSW 101125*, 1.1964, *Constable NSW 44465*, 4.1958; Mt Ginini, A.C.T., *McKee 7631*, 11.1960; Ginini Flat . . ., 30° 31' S, 148° 47' E, *Hartley 14171*, 12.1973; Mt Gingera [and its vicinity], *Crisp 6407*, 1.1980, *Powell 290 & McGrath*, 11.1975, *Moore 2261*, 2.1953, *Hoogland 8431*, 11.1961, *Evans 2565*, 11.1966, *Pullen 2542*, 1.1961; Quartzville, *Forsyth NSW 43402*, 11.1900, Bago Forest Reserve, *de Beuzeville NSW 43394*, 1.1917; Yarrangobilly, *Wits NSW 43400*, 10.1904; Long Plain – Between Yarrangobilly and Kiandra, *Hamilton NSW 43399*, 12.1943; Rules Point . . ., *Ellen NSW 43395*, 6.1917; Gurrangorambla Ck, Currango Plain, N. of Tantangara Dam, *Thompson 765*, 1.1971; Boboyan road at Naas R. crossing, between Gudgenby and Shannons Flat, *Pullen 2573*, 1.1961; Kiandra district, *Vickery NSW 43398*, 1.1940, *Betche NSW 43397*, 2.1897; Kiandra, *Whitfield NSW 43405*, 3.1924, *Forsyth NSW 101127*, 12.1901; mountain slope . . . half a mile [e. 0.8 km] W. of Kiandra, *Salasoo 3517*, 1.1969; Jerangle, *Australian Seed Co. NSW 99983*, 2.1968; Tumut Pond area, *Newman NSW 43415*, 1951; Toolong or Australian Alps, *NSW 43427*, 12.1884; Happy Jack R. gorge near Junction Shaft, *Filmor NSW 43404*, 2.1957; Happy Jacks Plain . . ., c. 15 miles [24 km] S. of Kiandra, *Thompson NSW 43393*, 1.1958; near Eucumbene Lookout, Snowy Mtns, *Goode 520*, 11.1961; Rhine Falls, *Burgess NSW 53077*, 1.1961; Big Badja R. near Cooma, *Whitfield NSW 43406*, 11.1925; Cooma district, *Hewett NSW 94841*, 12.1966; Tuross R., *Harnett NSW 43396*, 12.1927; between Cooma and Kydra, *Pullen 3985*, 12.1963; Upper Geehi R., *Gittins 647*, 1.1963; above road to W. of Geehi Reservoir, Snowy Mtns, *Raine ANU 10327*, 11.1970; Island Bend, *McGillivray NSW 85294*, 2.1957; Kydra Reefs fire trail, *Tindale 4003*, *Parris & Wimbush*, 1.1975; Jindabyne, *Maiden & Forsyth NSW 43403*, 1.1899; Pretty Point, *Maiden & Forsyth NSW 43430*, 1.1899, *Hehns NSW 43429*, 23.1889; Hannels Spur, Snowy Mtns, *Tinckam NSW 43436*, 1.1948, *Whaite 54*, 12.1948; Krackenback Mtn, *Bauerlen NSW 43425*, 1.1890; Hotel to Betts Camp, Mt Kosciusko, *Maiden NSW 43426*, 2.1914; Hotel Kosciusko, *Whaite 50*, 12.1948; vicinity of Kosciusko Hotel, *Steane NSW 43428*, 1.1910; Mt Kosciusko, *Harris NSW 43435*, 12.1924, *NSW 43413*, 1.1930, *Kretschmann NSW 43438*, 12.1893, *Hehns NSW 43424*, 2.1901, *Fraser NSW 43433*, 2.1940, *Frith NSW 43434*, 5.1913; (Mt Kosciusko–) Pipers Gap, *Moore 2864*, 2.1954; Kosciusko plateau, *Rodway NSW 43423*, 9.1924; Thredbo R., Mt Kosciusko, *Maiden & Forsyth NSW 43431*, 1.1899; Thredbo R. gorge, S. of Spencers Ck, *Johnson & Constable NSW 15743*, 1.1951; Nimmitabel, *Boorman NSW 43401*, 12.1916; Catheart, *Maiden NSW 43412*, 12.1896.

7. *Bossiaea oligosperma* A. Lee, *Telopea* 2(2): 215 (1981); Jacobs & Pickard, Pl. New South Wales: 119 (1981) (as B. sp. A). — HOLOTYPE: *Mitchell 434* (NSW !); ISOTYPES: BRI, CANB, K, L, MEL, US.

An erect, rather open shrub c. 1–2 m high with terete stems clothed with comparatively long and loosely crinkled, or shorter and more or less appressed hairs when young, later glabrescent. Leaves obscurely unifoliolate, alternate, shortly petiolate, distichous, the leaflets very broad-ovate to very broad-elliptical or almost circular, 2.5–5 mm long, with a short-acute or apiculate, downturned apex and a symmetrical, not cordate base; slightly folded upwards along the midrib, the margins flat, entire; both surfaces somewhat reticulate, the upper glabrous, the lower at first quite densely pubescent with soft, crinkled hairs, later with only a few hairs around the base of the midrib. Stipules 1–1.5 mm long, narrow-triangular, scarious, tan to dark brown, exceeding the petioles. Flowers mostly 8–11 mm long, solitary in the axils, on glabrous pedicels usually shorter than, but sometimes equal to, the subtending leaf. Bracts several in the series, crowded in the axil, glabrous except for an apical fringe of hairs. Bracteoles paired, c. 1 mm long, similar to but slightly longer than the uppermost bract and with it persistent at least to the early fruiting stage, inserted very low on the pedicel below the tip of the highest bract. Calyx 3–4 mm long, glabrous and slightly waxy, the teeth c. 1 mm long, shorter than the tube, the upper two broad, truncate with lateral points, united at the base and slightly longer than the triangular, acute, lower three. Petals of approximately equal length, the standard and wings bright yellow with some red coloration and some greenish yellow inside the standard, the keel dark red; all c. 1 cm long. Ovary narrowed into a slender stipe of 3–4 mm, glabrous, the ovules 3. Pod stipitate (the

stipe to 5 mm), glabrous, dark grey to blackish, obliquely elliptical with thickened margins, the lower less curved than the upper, 12–17 mm long and 7–10 mm broad, ripening 1 or 2 (–3) seeds. Seeds dark brown speckled with black, 3–3.5 mm long. Fl.: late Spring, especially Nov. Fr.: Nov.

DISTRIBUTION: On the rocky slopes and ridges near the Tonalli R. and Yerranderie (around the southern end of Lake Burratorong), in the southwestern part of the Central Coast of New South Wales; on soils derived from sandstone.

CENTRAL COAST: W. of W-4 fire road, ½ mile [0.8 km] E. of Lake Burratorong opposite Tonalli R., 34° 08' S. 15° 22' E, Mitchell 402, 8.1966 (CBG, K, NSW, PERTH, UC, Z); Tonalli R. landing towards Byrnes Ck, Warragamba, Mitchell 277, 11.1964 (A, CANB, NSW), 434, 9.1966 (BRI, CANB, K, L, MEL, NSW, US), 435, 9.1966 (CBG, NSW, PERTH); [near] Byrnes Automatic Recorder on Tonalli Road between Tonalli R. and Byrnes Ck, Mitchell 410, 8.1966 (BRI, MEL, NSW); 200 yds [c. 180 m] E. of Wollondilly R. [sic], Mitchell NSW 108144, 9.1968 (A, AD, B, BRI, CANB, CBG, G, K, MEL, NE, P, PERTH, S, US, Z).

8. Bossiaeae neo-anglica F. Muell., Fragm. 5: 106 (1866); Moore & Betche, Handb. Fl. New South Wales: 142 (1893); Maiden & Betche, Census New South Wales Pl.: 105 (1916); Beadle, Stud. Fl. N.E. New South Wales 3: 394, fig. 175 B5 (1976); Jacobs & Pickard, Pl. New South Wales: 119 (1981).—HOLOTYPE: MEL 18890 !; probable ISOTYPE: NSW 43644 !; see Lee (1970).

A small, often prostrate shrub with a thick woody stock and terete stems, at least the smaller ones pubescent with spreading hairs. Leaves apparently simple, alternate, closely spaced, very shortly petiolate, often obscurely asymmetrical at the base, cordate, usually 2–7 mm long, the margins entire, recurved, the upper surface distinctly darker than the lower, usually covered with minute tubercles and often with scattered hairs, the lower surface sparsely pubescent, the apex obtuse or occasionally acute, with a recurved often setaceous point. Stipules approximately 2 mm long, setaceous, spreading, persistent, exceeding the petioles. Flowers 9 mm long, solitary in the axils, usually rather few towards the ends of the branches, the pedicels 5 mm or less in length. Bracts few in the series, crowded in the axil, usually minute, at least sometimes persistent to the fruiting stage. Bracteoles paired, broadly ovate to obovate, usually 0.5–0.75 mm long, rarely to 1.5 mm, usually inserted near the middle of the pedicel, mostly glabrous, persistent. Calyx 3–5 mm long, glabrous or with spreading hairs, the lobes approximately equal to the tube, the lower three acute, the upper two very much broader and longer than the lower, very obtuse, rarely with a small lateral point, scarcely united at the base. Petals particoloured, the standard somewhat longer than the wings and keel, dark reddish outside and yellow within, the wings partly and keel largely dark reddish to brown. Ovary almost sessile, pubescent with rather long hairs at least at the apex and on the margins, the ovules approximately 8. Pod shortly stipitate (the stipe to c. 2 mm), glabrous or sparsely pubescent, almost flat, oblong, usually 2–2.5 cm long and 7–9 mm broad. Fl.: Spring to Summer, mostly Oct. Fr.: late Spring–Summer.

DISTRIBUTION: From southern Queensland near Wallangarra and Wyberba, through the Northern and Central Tablelands and higher parts of the North Coast to the Central Coast of New South Wales; in dry sclerophyll forest on sandy soils, often in more favoured sites.

NORTH COAST: “[The] Big Hill”, between Glen Innes and Grafton, Rodway NSW 43638, 10.1929; . . . Carrai State Forest, c. 35 miles [56 km] WNW. of Kempsey, McGillivray & Coveny 394, 7.1968. CENTRAL COAST: Oakdale-Ridge Rd, Evans NSW 93617, 11.1961; Burratorong road, Cambage 597, 11.1901; Thirlmere, Johnson NSW 47632, 10.1959; Thirlmere [as “Picton”] Lakes, Hamilton NSW 43652, 10.1911, Evans NSW 101119, 12.1962, Keats & Coveny 3445, 12.1970. (near the northwestern lake), Tindale NSW 93616, 11.1965; Wattle Ridge via Hilltop, Cheel NSW 43647, 2.1912, NSW 43648, 1.1912; Hilltop, Cheel NSW 43649, 10.1913; between Cumbertine Trig. and Running Ck, 2 miles [3 km] W. of Hilltop, McGillivray 1545, 12.1965. NORTHERN TABLELANDS: New England, (? Moore) NSW 43644, c. 1881 or earlier; Einnaville, Boorman NSW 43643, 10.1901; Gibraltar Range State Forest, 25 miles [40 km] ENE. of Glen Innes, Constable NSW 89577, 5.1961; Gibraltar Range National Park, Grieves 4, 10.1968; Pheasant Ck, Glen Elgin, Boorman NSW 43639, 12.1913; range near Backwater,

Guyra district, Blakely et al. NSW 43641, 10.1921; c. 6 miles [10 km] SW. of Ebor, Lee NSW 102497, 11.1968; Barrington Tops, Fraser & Vickery NSW 43640, 1.1934; Gloucester Tops, Lee NSW 101105, 1.1967, (1200 m alt.), Briggs 2466, 11.1968. CENTRAL TABLELANDS: Fitzroy Falls, Rodway NSW 43651, 11.1920, Rodway 219, 11.1930; Belanglo State Forest, c. 7 miles [11 km] WNW. of Sutton Forest, Williams NSW 43646, 8.1936.

9. Bossiaea prostrata R. Br., Bot. Mag. 36: t. 1493 (1812); R. Brown in W.T. Aiton, Hortus Kew. edn 2, 4: 268 (1812); Candolle, Prodr. 2: 117 (1825); G. Don, Gen. Hist. Dichl. Pl. 2: 129 (1832); J.D. Hooker, Fl. Tasmaniæ 1: 94 (1855); F. Mueller, Fragm. 3: 97 (1862); Bentham, Fl. Austral. 2: 162 (1864); Tate, Handb. Fl. Extratrop. South Australia: 65 (1890); Moore & Betche, Handb. Fl. New South Wales: 142 (1893); F.M. Bailey, Queensland Fl. 2: 364 (1900); Rodway, Tasmanian Fl.: 36 (1903); Maiden & Betche, Census New South Wales Pl.: 105 (1916); Williamson in Ewart, Fl. Victoria: 661 (1931); Blaek, Fl. South Australia edn 2, 2: 445 (1948); Curtis, Stud. Fl. Tasmania 1: 142 (1956); Beadle, Evans & Carolin, Handb. Vasc. Pl. Sydney Distr.: 253 (1963); Burbidge & Gray, Fl. Austral. Cap. Territory: 214 (1970); Beadle, Evans & Carolin, Fl. Sydney Region: 301 (1972); Willis, Handb. Pl. Victoria 2: 278 (1973); Beadle, Stud. Fl. N.E. New South Wales 3: 394, fig. 175 B2 (1976); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — LECTOTYPE: (BM !); see Lee (1970).

B. linnaeoides G. Don, Gen. Hist. Diehl. Pl. 2: 129 (1832). — TYPE: not investigated; see Lee, l.e.

B. nummularia Endl., Nov. Stirp. Decades: 22 (1839). — TYPE: not investigated; see Lee, l.e.

B. humilis Meisn. in Lehmann, Pl. Preiss. 1: 85 (1844). — TYPE: not investigated; see Lee, l.c.

A small procumbent undershrub with a thick woody stock and slender stems, the smaller stems somewhat flattened and usually with a short appressed or spreading pubescence, not usually showing any clear distinction between main stems and shorter lateral branches, all often under 20 cm long. Leaves unifoliolate, alternate, often rather distant, on petioles up to 5 mm long, the leaflets attached abaxially with a minute but distinct angled joint at the petiole junction, entire, flat or slightly recurved, narrow-ovate to circular or oblong, 3–15 mm long and very variable on the one plant but often about 1 em, the upper surface glabrous or slightly pubescent, usually conspicuously veined, the lower pubescent with sparse hairs or rarely glabrous, the apex obtuse or acute, with or without a small recurved point, the base symmetrical, rounded or slightly cordate. Stipules 1–2 mm long, usually ovate or narrow ovate, often acuminate, usually distinctly shorter than the petioles, or sometimes (in an aberrant form) equalling or slightly exceeding them. Flowers 6–10 mm long, solitary or two together in the axils, the pedicels up to 1.5 cm or even more in length, more or less sparsely pubescent with usually spreading hairs, shorter than or often clearly exceeding the subtending leaf. Bracts few in the series, on a minute axillary branch and usually with some pubescence, the uppermost c. 1 mm long, deciduous, the lower smaller and persistent. Bracteoles unevenly paired and narrower than the bracts, 1–3 mm long, sparsely pubescent, inserted on the pedicel below, or rarely at, the middle, and often close above the bracts, readily deciduous and sometimes apparently absent, leaving no perceptible scars. Calyx 3–5 mm long, pubescent like the pedicel, the lobes usually somewhat longer than the tube, all acute, or the upper two broadly acute with a median or lateral point, united near the base. Petals almost equal in length or the keel shortest, the standard orange-yellow inside, pinkish brown outside and drying pale, the wings and keel purplish brown. Ovary almost sessile, glabrous or rarely

pubescent; with up to 8 ovules. Pod nearly flat, broad- to narrow-oblong, 1.5–3 cm long. Chromosome number: $2n = 18$ (Sands, Proc. Linn. Soc. New South Wales 100 (2): 141 (1975)). Fl.: Spring, mostly Sept.–Oct. Fr.: late Spring to early Summer.

A few aberrant specimens, mostly from the Central Coast, especially the western outskirts of Sydney, marked “**” in the citations, show an approach to the closely related *B. buxifolia*: in their general aspect, having longer stems with some differentiation into main stems and short lateral branches, and also in having a darker colour on the outside of the standard petal, rather smaller leaflets 4–9 mm long, shorter petioles about equal to or slightly shorter than the stipules, and persistent bracteoles inserted about the middle of the pedicel.

The leaves, however, show (though sometimes obscurely) the angled joint of the unifoliolate *B. prostrata*, their leaflet bases are symmetrical, and bracteoles, though persistent, are usually inserted below, though often very close to, the middle of the mature pedicel.

Specimens of this variant are among Brown's original collections of *B. prostrata*.

DISTRIBUTION: Lower North Coast, Central Coast and South Coast, Central and Southern Tablelands, and perhaps the South Western Slopes of New South Wales, extending into Victoria, South Australia and Tasmania; in various habitats but probably with a preference for soils of higher water-retaining capacity.

NORTH COAST: Alum Mtn, Bulladelah, *Rupp NSW* 43598, 9.1924; 12 miles [19 km] S. of Stroud, *Coveny* 2139, 9.1969; Paterson, *Rupp NSW* 43657, 9.1925*; Belmont, *Davis NSW* 43601, 8.1941. CENTRAL COAST: Tuggerah, *Boorman NSW* 43600, 9.1903; Mona Vale, *Fraser NSW* 43602, 9.1928; Old Pitt Town Road, Scheyville, *Coveny* 10215, 10.1978*; Lapstone Hill, *Forsyth NSW* 43653, 9.1901*; Marayong, *Hind NSW* 85188, 9.1967*, *NSW* 85342, 10.1967*; Liverpool, *Leichhardt NSW* 43656, “11 Septbr”**; Hillview, near Liverpool, *Coveny NSW* 104545, 3.1967*; Duck R., Clyde, *Hamilton NSW* 43654, 9.1914*; St Marys, *Fletcher NSW* 43655, 9.1887*; Prospect, *Cambage* 3589, 9.1912; near Hurstville, *Camfield NSW* 43604; “Bindook”, Yerranderie, *Cambage* 2237, 10.1909; Thirlmere [as Picton] Lakes, *Thirlmere, Hamilton NSW* 43599, 10.1911; Thirlmere, *McBarron* 11108, 9.1965. SOUTH COAST: near Roseby Park, Shoalhaven R., *Rodway NSW* 43609, 10.1916; along Lighthouse Rd, Nowra, *Rodway* 60, 9.1930; Huskisson, *Rodway* 84, 9.1930; 5 km SW. of Pebbley Beach, c. 35° 35' S 150° 20' E, *Briggs* 3119, 12.1969; Watergum Ck, Womboyn, *Constable NSW* 43607, 10.1954; Doyles Farm, Narrabarba Ck, *Constable NSW* 43606 10.1954. NORTHERN TABLELANDS: Emmaville, *Boorman, NSW* 43589, 10.1911. CENTRAL TABLELANDS: Bare Rock, 25 miles [40 km] E. of Rylstone, *McGillivray* 1596, 2.1966; 6 km WNW. of Mittagong, *Thompson* 1656, 9.1972; Wingello, *Boorman NSW* 43592, 11.1899; Barbers Ck, *Maiden NSW* 43593, 10.1898. SOUTHERN TABLELANDS: Sugarloaf Ck road, c. 5 km off Yass to Wee Jasper road, *Pullen* 10961, 10.1977; Woodhouselee, near Crookwell, *Downes NSW* 43597, 11.1938*; Black Mtn, A.C.T., *Gauba CBG* 001045, 12.1952; W. side of Black Mtn, A.C.T., *D'Arnay* 426, 11.1965; Gibraltar Ck, A.C.T., *Burbidge* 7360, 11.1962; Mongarlowe, near Braidwood, *Cambage* 2041, 10.1908. SOUTH WESTERN SLOPES: Tumut–Tumbarumba–Holbrook district, *Norland NSW* 43595, 12.1947. WITHOUT PRECISE LOCALITY: *Sieber* 351, Fl. Novae Holl.

10. Bossiaea buxifolia A. Cunn. in Field, Geogr. Mem. New South Wales: 348 (1825); G. Don, Gen. Hist. Diehl. Pl. 2: 128 (1832); Bentham, Fl. Austral. 2: 163 (1864); F. Mueller, Key System Victorian Pl. 1: 216 (1888), 2: 18 (1886); Moore & Betche, Handb. Fl. New South Wales: 142 (1893); F.M. Bailey, Queensland Fl. 2: 365 (1900); Maiden & Betche, Census New South Wales Pl.: 105 (1916); Williamson in Ewart, Fl. Victoria: 661 (1931); Beadle, Evans & Carolin, Handb. Vasc. Pl. Sydney Distr.: 254 (1963); Burbidge & Gray, Fl. Austral. Cap. Territory: 214 (1970); Beadle, Evans & Carolin, Fl. Sydney Region: 301 (1972); Willis, Handb. Pl. Victoria 2: 279 (1973); Beadle, Stud. Fl. N.E. New South Wales 3: 394, fig. 175 B3 (1976); Jacobs & Pickard, Pl. New South Wales: 122 (1981); Cunningham et al., Pl. W. New South Wales: 385 (1981). — HOLOTYPE: n.v. (K); see Lee (1970).

*Aberrant form; see description.

B. decumbens F. Muell., *Fragm.* 1: 9 (1858). — SYNTYPES: MEL (18885–18889); see Lee, l.c.

A diffuse shrub, usually procumbent or up to c. 50 cm, rarely reaching 1.3 m in height, with terete stems, the stems pubescent with appressed or spreading hairs; main stems usually more than 20 cm long and distinguishable from the short lateral branches. Leaves apparently simple, alternate, closely spaced, very shortly petiolate, elliptical to almost circular or ovate to very broad-ovate, from less than 2 mm to more than 5 mm long and variable on each plant, the margins entire, usually recurved, the upper surface darker than the lower, shining, glabrous or sparsely pubescent, the venation usually conspicuous, the lower surface sparsely pubescent, the apex obtuse or acute, with a minute recurved point, the base slightly and asymmetrically cordate or sometimes rounded. Stipules 1–2 mm long, equalling or exceeding the petiole, lanceolate-setaceous, often dark brown. Flowers dark when dry, 6–10 mm long, in the axils usually at the ends of the short lateral branches, the pedicel often 1 cm in length, exceeding the subtending leaf. Bracts few in the series, up to 1 mm long, often pubescent, on a minute axillary branch (not always discernible), the uppermost often deciduous, the lower more hairy and more persistent. Bracteoles often unevenly paired, 1–2 mm long, inserted on the upper half of the pedicel but well removed from the base of the calyx, persistent. Calyx 3–6 mm long, pubescent with short appressed or spreading hairs, the lobes equal to or somewhat shorter than the tube, the lower three acute, the upper two usually very much broader and longer than the lower, very obtuse though often with a lateral point, or occasionally, acute and curved, united for a short distance at the base. Petals particoloured, the standard dark outside, bright yellow inside and somewhat longer than the wings (orange outside and yellow within) and keel (purplish or pale with a purple base). Ovary almost sessile, glabrous with densely pubescent margins, the ovules approximately 8. Pod very shortly stipitate, glabrous or with pubescent margins, almost flat, narrow-oblong, approximately 2 cm long. Chromosome number: $2n = 18$ (Sands, Proc. Linn. Soc. New South Wales 100 (2): 141(1975)). Fl.: Spring, usually Oct.–Nov. Fr.: late Spring to Summer.

DISTRIBUTION: In most parts of eastern New South Wales, probably most abundant in the Southern Tablelands; also in the Main Divide and its slopes in Victoria, and recorded for Queensland; on a variety of soils, on river flats, in woodland and in dry sclerophyll forest.

CENTRAL COAST: Marsdens Arm, 44 miles [71 km] S. of Singleton on Putty Road, *Briggs* 1329, 9.1967; Yerranderie, *Cambage* 3138, 12.1911. SOUTHERN COAST: Badgerys Crossing to Nowra, *Forsyth & Hamilton NSW* 43630, 9.1899; Bendethera Caves, 20 miles [32 km] e. west of Moruya, *Constable* 6868, 5.1966; Tuross R., near Belowra, *Constable NSW* 26193, 9.1953. NORTHERN TABLELANDS: Emmaville, *Boorman NSW* 43632, 10.1901; Dingo Creek, 70 km E. of Waleha, Kangaroo Flat, *Hitchcock NSW* 117322, 11.1978. CENTRAL TABLELANDS: Portland, *Gedden NSW* 43624, 10.1893; Limekilns, N. of Bathurst, *Whate* 897, 1.1951; Marrangaroo Crk, 4½ miles [7 km] NW. of Lithgow, *Constable NSW* 117323, 2.1961; Morts Gully, Lithgow, *Boorman NSW* 43635, 10.1914; Esk Bank, *Hamilton NSW* 43622, 11.1913; Kanimbla Valley, *Burgess NSW* 95473, 5.1959; between Perrys Lookdown and Blue Gum Forest, Blackheath, *Coveny NSW* 104544, 5.1967; Rockley, *Boorman NSW* 43637, 11.1906; Jenolan Caves, *Blakely NSW* 43623, 10.1899; Coxs R., *Maiden & Cambage NSW* 43636, 10.1904; Wingello, *Boorman NSW* 43628, 12.1899; Barbers Crk, *Runsey NSW* 43629, 2.1900. SOUTHERN TABLELANDS: Goulburn, *Moore* 2732, 10.1953; S. side of Bungonia Gorge, *Rodd NSW* 101123, 12.1965; Collector, *Sheridan NSW* 52977, 1.1961; c. 17 miles [c. 27 km] E. of Tarago, Mulwaree Shire, *Adams* 1803, 6.1967; NE. of Canberra City, A.C.T., NW. slope of Mt Ainslie, *Kanis* 1465, 2.1971; lower SE. slope of Black Mtn, near reservoir track, A.C.T., *Pullen* 2293, 10.1960; Black Mtn, A.C.T., *Gauba CBG* 000822, 12.1952; around Lake Burley Griffin, A.N.U., A.C.T., *Solling* 39, 2.1972; Canberra, A.C.T., *McKee* 8858, 12.1961; Tinderry Mts, *Hartley* 13423, 11.1971; Coree Crk, below Blundells Flat, A.C.T., *Pullen* 857, 6.1958; Tidbinbilla Flora and Fauna Reserve, A.C.T., *Canning* 3093, 12.1969; "Booroomba", A.C.T., *Cambage* 3011, 11.1911; Curoekbilly, *Boorman NSW* 43620, 2.1910; Monga or Sugar Loaf Mtn, near Braidwood, *Boorman NSW* 43619, 5.1909; Gibraltar Crk, A.C.T., *Burbridge* 7372, 10.1962; S. of Glendale Crossing, A.C.T., *Burbridge* 6758, 11.1960; Gudgenby, A.C.T., *Cambage* 3377, 1.1912; Cave Crk, ¼ mile [0.4 km] below the Blue Waterholes (11 miles [18 km] NE. of Rules Point), *Rodd* 768, 4.1969; Cave Creek, 18 miles [29 km] NNE. of Kiandra, *Rodd & Coveny* 2628, 12.1969; Yarrangobilly R., Ravine, 8 miles [13 km] NW. of Kiandra, *Rodd & Coveny* 2697, 12.1969; S. of Gudgenby-Boboyan,

A.C.T., *Burbridge* 6775, 11.1960; near Mittagong Bridge (Murrumbidgee R. near Cooma), *Costin NSW 43618*, 10.1948; Cooma, *Betche NSW 43621*, 12.1890, *Cambage 2102*, 11.1908; 8 km by road E. of Delegate R. on Quedong-Bombala road, *Blaxell 455*, 12.1970. NORTHI WESTERN SLOPES: Stanborough (between Howell and Tingha), *McBarren NSW 113690*, 6.1970; Nandewar Ra., NE. of Barraba, *Rupp NSW 43631*, 9.1914; Gundamulda, near Barraba, *Rupp NSW 43633*, 10.1914. CENTRAL WESTERN SLOPES: Goonoo State Forest, *McKee NSW 43634*, 9.1952; Drillwarina State Forest near Eumungerie, *McReaddie NSW 99951*, 9.1967; 3 miles [5 km] SSW. of Merriwa, Hunter Valley, *Story 6975*, 11.1959; 7 miles [11 km] Ulan-Cassilis road, *Althofer 500*, 8.1971; Bowan Park, *Blakely NSW 43626*, 11.1907; Borenore, *Pratten NSW 117324*, 10.1976.

11. Bossiaea scortechinii F. Muell., Wing's Southern Science Record 3: 1 (1883); Moore & Betche, Handb. Fl. New South Wales: 142 (1893); F.M. Bailey, Queensland Fl. 2: 365 (1900); Maiden & Betche, Census New South Wales Pl.: 105 (1916); Beadle, Stud. Fl. N.E. New South Wales 3: 394, fig. 175 B4 (1976); Jacobs & Pickard, Pl. New South Wales: 118 (1981). — HOLOTYPE: MEL 18891 !; see Lee (1970).

A small shrub, occasionally a metre or more broad, with slender, prostrate primary branches radiating from a woody stock and bearing erect secondary branches, the smaller stems somewhat flattened and usually with loosely appressed, silky hairs. Leaves obscurely unifoliolate, shortly petiolate, the leaflets narrow-elliptical to broadly-obovate, from less than 5 mm to more than 2 cm long, the margins entire, recurved or occasionally revolute, the upper surface coriaceous and somewhat reticulate, often with sparse spreading or appressed hairs, the lower densely pubescent to glabrous, the apex obtuse with a small recurved point. Stipules 1–2 mm long, ovate or narrow-ovate, acuminate, curved, exceeding the petioles. Flowers approximately 7 mm long, solitary in the axils, or rarely in few-flowered axillary racemes, the pedicels of variable length, mostly short but occasionally quite long and slender, up to 2 cm (7–9 mm in Holotype, 3.5–4.5 mm in (?) Isotype NSW 43443); in a few specimens with atypically long, slender pedicels, e.g. NSW 43449 and *Coveny 5116*, showing development of an axillary branch, and in NSW 43449 showing more than one pedicel from the axillary branch. Bracts few in the series, usually crowded in the axil and less than 2 mm long, more or less deciduous. Bracteoles paired, 2–3 mm long, inserted usually about the middle of the pedicel. Calyx 3–5 mm long, pubescent with appressed or spreading silky hairs, the lobes equal to or somewhat shorter than the tube, acute or acuminate, the upper two broader than the lower three, often curved, and united for a short distance at the base. Petals almost equal in length and mostly orange to yellow inside, with the standard usually pinkish to red-brown outside and keel from paler yellow to much marked with red. Ovary almost sessile, with long dense hairs, the ovules approximately 8. Pod almost sessile, pubescent, flat, oblong or narrow-oblong, 1–2 cm long. Fl.: Spring. Fr.: late Spring–Summer.

DISTRIBUTION: In the northeastern quarter of New South Wales, extending into southern Queensland (Darling Downs); on sandy, often granitic soils in dry sclerophyll forest.

NORTHI COAST: Bandjalung National Park [as Reserve], c. 1 mile [1.6 km] S. of Evans Head, *Coveny 5116*, 9.1973. NORTHERN TABLELANDS: Wilsons Downfall, near Tenterfield, *Boorman NSW 43445*, 11.1904; Boonoo Boonoo, *Boorman NSW 43446*, 11.1904; Jennings, *Boorman NSW 43448*, 10.1901, *Maiden & Boorman NSW 43449*, 12.1903; 12.8 km N. of Tenterfield on Mt. Lindesay Hwy., *Armstrong 583*, 11.1973; Tenterfield, *Betche NSW 43450*, 11.1886; Torrington, *Cambage 1731*, 9.1907, *Boorman NSW 43451*, 1.1911, *Boorman NSW 43456*, 10.1911; 22.5 km from Glen Innes along Emmaville Road, *Armstrong 636*, 11.1973; Lookout Point, Gibraltar Range State Forest, 30 miles [48 km] NE. of Glen Innes, *Constable NSW 43454*, 4.1956; 17.5 km. N. of Glen Innes on New England Hwy, *Telford 2492*, 11.1970; 37 km NE. of Glen Innes on Gwydir Hwy, *Telford 2416*, 11.1970; Gibraltar Range National Park, c. 42 miles [68 km] E. of Glen Innes, *Coveny 2242*, 10.1969; "Gibraltar State Forest" 35 miles [56 km] E. of Glen Innes, *Williamis 661*, 10.1958; Biscuit Ck, 7.5 miles [12 km] NW. of Ebor on Guyra road, *Ford NSW 42799*, 1.1958; Yaroona, Snowy Ras, 45 miles [72 km] E. of Armidale, *Davis NSW 43460*, 1.1941; Round Mtn, Guy Fawkes, *Boorman NSW 43458*, 12.1909; 18 miles

[29 km] SW. of Guyra, Blakely et al. NSW 43459, 10.1929; 6 miles [10 km] SW. of Ebor, Lee NSW 102496, 11.1968; Wollomombi Falls, Wissman NSW 84203, 10.1963. NORTH WESTERN SLOPES: Frasers Creek, near Ashford, Boorman NSW 43453, 9.1910; 6 miles [10 km] N. of Tingha, Canbage 942, 10.1903; 6 miles [10 km] NW. of Tingha on road to Gilgai, Lee NSW 102495, 11.1968. CENTRAL WESTERN SLOPES: Rylstone, Thorne NSW 43591, 10.1934.

12. *Bossiaea rhombifolia* Sieber ex DC., Prodr. 2: 117 (1825); F. Mueller, Fragm. 9: 45 (1875); F.M. Bailey, Queensland Fl. 2: 365 (1900); Beadle, Stud. Fl. N.E. New South Wales 3: 392 (1976); the foregoing references apply to the species as defined here; see also under the subspecies; Jacobs & Pickard, Pl. New South Wales: 118 (1981). — HOLOTYPE: n.v. (G), photo (NSW !); see Lee (1970).

A glabrous or near-glabrous shrub usually 1–2 m high, the branches, at least when young, somewhat flattened and grooved, broadened at the nodes. Leaves alternate, unifoliolate, distiehous, shortly petiolate, the leaflets less than 1 cm long, broad-obovate to -obtrullate, with an acute or retuse apex. *Stipules* about as long as the petiole, up to 1 mm, triangular. Flowers 7–12 mm long, solitary in the axils on short pedicels c. 5 mm long. *Bracts* few in the series, rather firm in texture, crowded in the axil, very shortly ciliate, only the uppermost attaining 1 mm in length. *Bracteoles* paired, similar to the uppermost bract and overlapped by it, inserted low on the pedicel; all persistent. *Calyx* 3–5 mm long, the lobes much shorter than the tube, the lower three acute, the upper two broader, obtuse or often with a small lateral point, united near their base. *Petals* with the standard and wings orange-yellow and equal to or shorter than the concolorous or more frequently dark purplish keel. *Ovary* long-stipitate, glabrous, with e. 4 ovules. *Pod* stipitate, glabrous, flat, obovate to oblong, 1–2.5 cm long, with somewhat woody valves and thickened margins. *Chromosome number* for both subspecies: $n = 9$, $2n = 18$. (Sands, Proc. Linn. Soc. New South Wales 100 (2): 142 (1975)). Fl.: (July–) Aug.–Sept. (–Oct.). Fr.: late Spring to Summer.

DISTRIBUTION: Coast, Tablelands and Western Slopes in the northern half of New South Wales extending into the northeastern corner of the North Western Plains and into Queensland (see under the subspecies).

B. rhombifolia is clearly differentiated into an eastern subspecies, ssp. *rhombifolia*, which occurs chiefly along the Tablelands and Coast, and a smaller-leaved subspecies, ssp. *concolor*, in the western part of the range, chiefly in the Western Slopes. Both are present in the North Western Slopes and extend into Queensland where their climatic preferences appear to be similar to those shown in New South Wales.

1. Leaflets broad, the breadth not less than five-sixths of the length, with a short-acute apex; c. 8–10 mm long, 7–10 mm broad; flowers often 1 cm long ssp. *rhombifolia* a.
- 1.* Leaflets narrow, the breadth not more than two-thirds of the length, with an obtuse, truncate or retuse apex; c. 3–9 mm long, 2–6 mm broad; flowers often 7–8 mm long ssp. *concolor* b.

a. *B. rhombifolia* ssp. *rhombifolia*

Bossiaea rhombifolia Sieber ex DC., Prodr. 2: 117 (1825); Sweet, Fl. Australasica: t. 9 (1827); G. Don, Gen. Hist. Diehl. Pl. 2: 128 (1832); Bentham, Fl. Austral. 2: 164 (1864); Moore & Betche, Handb. Fl. New South Wales: 142 (1893); Maiden & Betche, Census New South Wales Pl.: 105 (1916); Beadle, Evans & Carolin, Handb. Pl. Sydney Distr.: 254 (1963), Fl. Sydney Region: 301 (1972); Jacobs & Pickard, Pl. New South Wales: 118 (1981). See also under the species.

B. rotundifolia DC., Prodr. 2: 117 (1825); G. Don, Gen. Hist. Diehl. Pl. 2: 128 (1832). — HOLOTYPE: n.v. (G), photo (NSW !); see Lee (1970).

{*B. lenticularis* misappl., non Sieber ex DC.: Loddiges, Bot. Cab. 13: t. 1238 (1827).}

Diagnostic characters as given in the key. Differs from ssp. *concolor* also in having the leaflets almost flat, even when dry, and spaced, on the ultimate branches, c. 2–5 per cm, and flowers with the standard orange-yellow marked with red and the keel dark purplish red.

DISTRIBUTION: In the eastern part of the species range, viz. North and Central Coast, North, Central and Southern Tablelands and North Western Slopes (in rocky elevated parts) of New South Wales, and in Queensland (in ranges of the southeastern Darling Downs); often in dry sclerophyll forest on sandstone or less commonly granite.

NORTH COAST: Coal Ridge, 10 miles [16 km] N. of Ramornie, *Blakely & Shiress NSW* 43853, 7.1922; 12 miles [19 km] SE. of Coaldale, . . ., *Clark, Pickard & Coveny 1854*, 8.1969; Sherwood Forest (between the railway line and Pacific Hwy N. of Glenreagh), *Grieves NSW 101174*, 10.1964; Waihou Forest Reserve, . . . W. of Woolgoolga, *Burgess 283*, 8.1973; Tuncurry State Forest, *Burgess NSW 56746*, 7.1961; Shoal Bay, Port Stephens, *Davis NSW 43851*, 9.1941; 4 miles [6 km] from Raymond Terrace on Salt Ash road, Hunter Valley, *Story 6543*, 8.1959; Belmont, *Dwyer NSW 43847*, 3.1920. CENTRAL COAST: Green Gully, Glen Davis, . . ., *Constable 5934*, 5.1965; Happy Valley, Glen Davis, *Constable NSW 88694 "18"*, 3.1968; Colo Heights, *Altiofer (Burrendong Herb. 2033)*; Sackville Reach, *Blakely NSW 43841*, 9.1927; c. 3 miles [5 km] N. of Wilberforce, *Tindale NSW 48871*, 11.1959; Grose R., and banks of Nepean R., near confluence with the Grose, *Maiden & Cambage NSW 43849*, 9.1906; Penrith-Richmond road, *Constable NSW 16336*, 10.1950; Springwood, *Betche NSW 43838*, 12.1889. *Hamilton NSW 43843*, 11.1913, *NSW 43837*, 9.1914, *Constable NSW 43831*, 2.1947; Valley Heights, *Hamilton NSW 43830*, 10.1914, *Morris NSW 43832*, 9.1927; Linden, *Hamilton NSW 43836*, 9.1914, *Constable NSW 43848*, 2.1948; Lapstone Hill, *Forsyth NSW 43846*, 9.1907; Port Jackson district, *Boorman NSW 101192*, 8.1904; Frenchs Forest, *Mills NSW 43829*, 8.1940; Blaxland, *Constable NSW 11463*, 10.1949; Mitchells Pass, Glenbrook, *Jolinson & Constable NSW 18391*, 7.1951; 2 miles [3 km] S. of Woodford, on St. Helena Road, *Constable NSW 53748*, 11.1960; Nortons Basin, *Rodway NSW 43842*, 11.1935, (33° 52' S, 150° 37' E . . .), *Stevenson & Coveny 3651*, 9.1971; Nepean R., *Rupp NSW 43844*, 9.1916; Warragamba Gorge, 5 miles [8 km] from dam, *Mitchell 427*, 9.1966; Bents Basin, Nepean R., *Maiden NSW 43839*, 6.1913; Heathcote, Woronora R., *Hamilton NSW 43840*, 10.1915; Woronora R., *Cleel NSW 117326*; Helensburgh, *Forsyth NSW 43834*, 9.1897; Brimstone Gully, ½ mile [0.8 km] W. of State Coal Mine, *Mitchell 1668*, s.d., 669, 12.1972; Thirlmere [as Picton] Lakes, *Thirlmere, Briggs NSW 117327*, 4.1970; Avon Dam, via Bargo, *Pullen 2180*, 8.1960. NORTHERN TABLELANDS: Pheasant Mtn [30° 05' S, 151° 55' E], vicinity Backwater, *Gray (3907) NSW 43852*, 4.1956. . ., *McGillivray & Coveny 3608*, 4.1971; range near Backwater, Guyra district, *Blakely et al. NSW 43850*, 10.1929. CENTRAL TABLELANDS: Sir Johns Point, Mt Gundangaroo, 15 miles [24 km] ENE. of Capertee, *Constable 7219*, 10.1966; Genowlan Mtn, 7 miles [11 km] NE. of Capertee, *Constable 5049*, 9.1964; Hilltop, *Cleel NSW 43845*, 7.1914; Belanglo State Forest, W. of Sutton Forest, *Williams NSW 43833*, 8.1936. SOUTHERN TABLELANDS: spur N. of Wadbilliga Mtn, *Olsen 2368*, 10.1974. NORTH WESTERN SLOPES: c. 2 km W. of Timor Rock towards Warrumbungle National Park, *Wilson 2440 & Waterhouse*, 8.1979; Timor Rock [31° 16' S, 149° 09' E], Coonabarabran, *Boorman NSW 43859*, 9.1908; Coonabarabran, *Boorman NSW 43858*, 9.1916. WITHOUT PRECISE LOCALITY: New South Wales, *Caley*, 1799-1810; *Sieber 354*, Fl. Novae Holl.

b. *B. rhombifolia* ssp. *concolor* (*Maiden et Betche*) A. Lee, Contr. New South Wales Natl. Herb. 4(3): 97 (1970); Jacobs & Pickard, Pl. New South Wales: 118 (1981). — *B. rhombifolia* var. *concolor* Maiden et Betche (basionym), Proc. Linn. Soc. New South Wales 33: 307 (1908); Census New South Wales Pl.: 105 (1916). *Sine nom.* sub *B. rhombifolia*: F. Mueller, Fragm. 9: 45 (1875); F.M. Bailey, Queensland Fl. 2: 365 (1900). See also under the species. — HOLOTYPE: NSW 43872 !; see Lee (1970).

Diagnostic characters as given in the key. Differs from ssp. *rhombifolia* also in having the leaflets often folded upwards along the midrib in dried specimens, and, on ultimate branches, c. 4–8 per cm, the flowers as in ssp. *rhombifolia* or with all the petals orange-yellow, and the plants generally smaller, to c. 60 cm high, and more slender, the foliage with a slightly glaucous tint.

DISTRIBUTION: In the western part of the species range, viz. North Western Plains (but only around Narrabri), North and Central Western Slopes of New South Wales (? in the less rocky parts, and

at lower elevations), and in the Leichhardt, Maranoa and Darling Downs Districts of Queensland; like ssp. *rhombifolia*, on sandy soils, but usually in drier situations.

NORTH WESTERN SLOPES: Warialda, Rupp NSW 43861, 9.1905, Vickery NSW 43863, 9.1932, Johnson NSW 5182, 9.1947; near Warialda, Whate 1027, 8.1951; Billy Ck, Newell Hwy, c. 50 km NE. of Coonabarabran, Briggs 3051 & Johnson, 11.1969; Tummallaloo Ck, 30 miles [48 km] NNE. of Coonabarabran on Narrabri road, Johnson NSW 17512, 11.1951; 28 miles [45 km] from Coonabarabran towards Gunnedah, Stanley NSW 93850, 10.1966; Trinkey State Forest, 50 km SW. of Gunnedah, Kennedy, 10.1977; 9.7 km along Coonabarabran to Gilgandra road, Althofer (*Burrendong Herb.* 7878), 10.1977; e. 2 miles [3 km] N. of Long Ridge, e. 22 miles [35 km] E. of Coonabarabran, Briggs & Rodd B2277, 9.1968; Warrumbungle Ranges, Forsyth NSW 43860, 10.1899; Bidden State Forest (e. 12 miles [19 km] S. or S. by W. of Tooraweenah near Bidden), McReadie NSW 48518, 11.1959. CENTRAL WESTERN SLOPES: Munghorn Gap, NE. of Cooyal. McKee NSW 43856, 10.1952.

13. Bossiaea heterophylla Vent., Jard. Cels: t. 7 (1800); Willd., Sp. Pl. edn 4, 3(2): 972 (1802); Smith, Trans. Linn. Soc. 9: 302 (1808); R. Brown in W.T. Aiton, Hortus Kew. edn 2, 4: 267 (1812); Loddiges, Bot. Cab. 3: t. 271 (1818); Candolle, Prodr. 2: 117 (1825); G. Don, Gen. Hist. Dichl. Pl. 2: 128 (1832); F. Mueller, Fragm. 3: 97 (1862); Bentham, Fl. Austral. 2: 165 (1864); Moore & Betche, Handb. Fl. New South Wales: 143 (1893); F. M. Bailey, Queensland Fl. 2: 366 (1900); J. Britten in Banks & Solander, Ill. Bot. Cook's Voy. 1: 18, t. 51 (1900); Maiden & Betche, Census New South Wales Pl.: 105 (1916); Domin, Biblioth. Bot. 22 (89²): 728 (1925); Williamson in Ewart, Fl. Victoria: 663 (1931); Beadle, Evans & Carolin, Handb. Pl. Sydney Distr.: 254 (1963); Beadle, Evans & Carolin, Fl. Sydney Region: 301 (1972); Willis, Handb. Pl. Victoria 2: 279 (1973); Beadle, Stud. Fl. N.E. New South Wales 3: 392, fig. 175 B1 (1976); Jacobs & Pickard, Pl. New South Wales: 118 (1981). — TYPE: n.v.; see Lee (1970).

Platylobium lanceolatum Andr., Bot. Repos. 3: t. 205 (1802). — *Bossiaea lanceolata* (Andr.) Sims, Bot. Mag. 28: t. 1144 (1808). — TYPE: n.v.; see Lee, l.c.

P. ovatum Andr., l.c. 4: t. 266 (1802). — *Bossiaea ovata* (Andr.) Sm., Trans. Linn. Soc. 9: 303 (1808); G. Don, Gen. Hist. Dichl. Pl. 2: 128 (1832). — TYPE: n.v.; see Lee, l.c.

B. heterophylla Vent. var. *stenoclada* Domin, Biblioth. Bot. 22 (89²): 728 (1925). — TYPE: n.v.; see Lee, l.c.

A variable shrub, almost completely glabrous, usually less than 1 m but up to 2 m high, with flattened often glaucous stems occasionally bearing a few hairs. Leaves unifoliolate, alternate, distichous, with distinctly abaxial attachment of the leaflets, the leaflets usually 1–3 cm long, very narrow- to broad-ovate, rarely broad-obovate, broader in young plants and shoots, with entire, flat or incurved to involute margins. Stipules 1 mm or less, deltoid, inconspicuous. Flowers 7–15 mm long, solitary in the axils, on pedicels c. 5 mm long. Bracts few in the series, crowded in the axil, the lower ones pubescent, the uppermost ciliate at least near the apex, up to 1.5 mm long, persistent to the fruiting stage. Bracteoles similar to the uppermost bract but more cymbiform, inserted on the lower half of the pedicel but usually not below the tip of the uppermost bract, persistent often to the young fruiting stage. Calyx 4–6 mm long, the lobes equal to or shorter than the tube, acute, the upper two broader than the lower three, curved and united for part of their length. Petals of unequal length, the standard a little shorter to longer than the keel, both distinctly longer than the wings, the standard and wings orange-yellow (the former with reddish suffusion outside), the keel dark reddish. Ovary stipitate, glabrous, the ovules approximately 8. Pod long-stipitate, glabrous, flat or somewhat biconvex, usually narrow-oblong, 2.5–4 cm long, the valves rather woody. Chromosome number: $2n=18$ (Sands, Proc. Linn. Soc. New South Wales 100 (2): 141 (1975)). Fl.: Autumn, mostly Apr.–May. Fr.: Winter–Spring.

DISTRIBUTION: Common in all the Coastal subdivisions of New South Wales, extending into southeastern Queensland (Moreton District); also in the Central and Southern Tablelands; almost invariably on sandy soils (in dunes, hind-dune heaths and forests, sandstone scrub on rocky ridges, dry sclerophyll forest), especially of the Hawkesbury Sandstone series of the Central Coast; rarely also on shale in this area.

NORTH COAST: Wardell, *Lumby NSW* 43927, 4.1941; Angourie, *Gordon NSW* 96211, 3.1961; Lake Arragan (c. 7 miles [11 km] S. of Yamba and 10 miles [16 km] SE. of Maclean), *Grieves NSW* 102441, 6.1968; Barcoongere State Forest, 40 miles [64 km] SE. of Grafton, *Constable NSW* 38474, 4.1956; Cofts Harbour, *Boorman NSW* 43930, 6.1911; behind Lighthouse Beach, S. of Port Macquarie, *Pullen* 2624, 5.1961; Nabiac, via Taree, *Gilbert NSW* 43916, 7.1947; Tunecurry State Forest, *Burgess NSW* 56745, 7.1961; Seal Rocks, *Fox* 7907009, 7907036, 7.1979; One Mile Beach, Anna Bay (Port Stephens area), *McDonald* (S.126) *NSW* 84978, 4.1967; Tomago, *McDonald* (S.34) *NSW* 81901, 5.1966. CENTRAL COAST (selections only, from numerous specimens): Olney State Forest, 25 miles [40 km] SW. of Newcastle, *Constable NSW* 75574, 5.1960; Putty road, 48 miles [77 km] N. of Windsor, *Hartley per McBarron* 12501, 4.1966; Ourimbah State Forest, near Central Mangrove, *de Beuzeville NSW* 43886, 4.1918; Pacific Highway, 5.6 km W. of Kariong, *Covey* 4875, 5.1973; "Warrath" Sanctuary (Pearl Beach), *Oxford NSW* 43898, 4.1949; Cowan to Jerusalem Bay, *Salasso* 2126, 4.1961; Newport, *Ford NSW* 43905, 4.1946; 3 miles [5 km] NW. of Hornsby towards Crosslands, Berowra Ck, *Joluson* *NSW* 43909, 4.1945; Springwood, *Cross NSW* 43918, 3.1934; Hornsby, *Blakely NSW* 43878, 5.1914; Kuringai Chase, *Mair & Constable NSW* 16231, 10.1950; Tumbledown Dick [on Mona Vale road between Mona Vale and Terrey Hills], *Blakely & Shiress NSW* 43882, 6.1919, *Rodway NSW* 43889, 4.1924; Wahroonga, *Salasso* 672, 4.1951; Parramatta, *Caley*, 5.1807; Sydney, *Backhouse* [as *Blackhouse*] 62, 1835; Botany, *Fletcher NSW* 43902, 4.1887; Malabar, *Gibbons NSW* 96212, 8.1964; La Perouse, *Rupp NSW* 43890, 5.1916; Milperra, *Johnson NSW* 43910, 10.1946; Oatley West, *Canfield NSW* 84673, 5.1902; Botany Bay, *Banks & Solander NSW* 133730, 1770; Kurnell, *Boorman NSW* 43881, 5.1906; Loftus, *Canfield NSW* 84676, 11.1894; Engadine, *Whate* 950, 4.1951; Campbelltown, *McBarron* 9099, 8.1964; Georges R., Campbelltown, *Ford NSW* 43911, 5.1945; National Park, *Carne NSW* 117329, 5.1905; Waterfall, *Rodway* 1065, 5.1933; Appin-Bulli road, Loddon R., *McBarron* 7156, 4.1962; Austimmer, *Rodway NSW* 43888, 7.1933; Cordeaux Dam, 5 miles [8 km] W. of Wollongong, *Constable NSW* 38475, 5.1956; Avon Dam, *Constable NSW* 3978, 7.1947; Yerrinbool, *Johnson NSW* 43923, 4.1951; Hilltop, *Cheel NSW* 43928, 7.1914; West Cambewarra road, Nowra, *Rodway* 437, 5.1931; Bomaderry, *Rodway NSW* 43931, 4.1916. SOUTH COAST (selections only): Wongamia road, . . . Nowra, *Rodway* 21, 10.1928, 1062, 4.1933; S. Coast road, 4 miles [6 km] S. of Nowra, *Rodway NSW* 43937, 9.1930; Point Perpendicular, northern head of Jervis Bay, *Constable NSW* 52814, 10.1960; Jerrawangala, 4 miles [6 km] from Wundandian, *Williams NSW* 43939, 3.1934; near Naval College, Jervis Bay, *Rodway NSW* 43932, 5.1916; Sussex Inlet, *Rodway NSW* 43941, 4.1921; near Pigeon House Mtn. W. of Ulladulla, *Pullen* 4845, 6.1973; Bawley Point to Kioloa, SW. of Ulladulla, *Salasso* 5069, 5.1973; O'Hara Head between Ulladulla and Batemans Bay, *Rodway* 2923, 5.1939. CENTRAL TABLELANDS: Creek to E. of Holbrook Castle, 5 miles [8 km] S. of "Holbrook", *Whate* 3350, 9.1969; 2 miles [3 km] N. of Mt Coricudgy, *McGillivray & Rodd* 132, 4.1965; Cyril's Rock, 11 miles [18 km] N. of Gospers Mtn, *Rodd & McGillivray* 1156, 4.1965; Mt Wilson, *Maiden NSW* 43917, 4.1896; Bell railway station, *Constable NSW* 11120, 3.1950; Rotary Nature Trail, Megalong Glen, Blackheath, *Constable* 6764, 3.1966; Blackheath, *Maiden NSW* 43926, 4.1899, *Constable NSW* 43922, 2.1948, *NSW* 11432, 1.1950; Mt Werong (near Oberon), *Cambage* 3145, 12.1911; Kings Tableland, Erskine Cr road, 6 miles [10 km] S. of 2KA radio station, *Wilson* 507, 3.1957; Bundanoon Reserve, *Chippendale NSW* 43921, 6.1953; Echo Point, Bundanoon, *Tindale NSW* 3302, 4.1947. SOUTHERN TABLELANDS: . . . vicinity of Mt Sassafras, c. 17 miles [27 km] E. of Nerriga . . . *Hartley* 14300, 3.1975. WITHOUT PRECISE LOCALITY: *Sieber* 352, Fl. Novac Holl.; *Leichhardt NSW* 43884; Iter austral., *Brown*, 1802-5.

14. Bossiaeae stephensonii F. Muell., Proc. Linn. Soc. New South Wales 2nd ser., 1: 1107 (1887); Moore & Betche, Handb. Fl. New South Wales: 143 (1893); Maiden, Ill. New South Wales Pl. 2: 27, t. 13 (1908); Maiden & Betche, Census New South Wales Pl.: 105 (1916); Beadle, Evans & Carolin, Handb. Vasc. Pl. Sydney Distr.: 254 (1963), Fl. Sydney Region: 301 (1972); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — HOLOTYPE: MEL 20329!; sec Lee (1970).

A shrub, often caespitose from a woody stock, 1 m or less in height, glabrous or the young stems and leaves with sparse, long, fine, hairs, the stems flattened. Leaves unifoliolate, alternate, petiolate, the petiole armed with a distinct dorsal spur, the leaflets narrow-cliptical to oblong, occasionally broadest above the middle, usually 1-2 cm long, the margins entire, scabrous, flat or recurved, the apex obtuse or acute, tapering suddenly or gradually to a long or short, usually recurved, often pungent, tip. Stipules rather large and erect, green, becoming brown, often

more than 5 mm, rarely 1 cm, long, elongate-deltoid with the base usually c. 2 mm broad. *Flowers* 8–12 mm long, solitary in the axils, on pedicels up to 7 mm long. *Bracts* only 2 or 3 in the series, crowded in the axils and accompanied by crowded, short, fine hairs, shortly ciliate; uppermost bract slightly shorter than, but closely similar to the bracteoles. *Bracteoles* paired, c. 2.5 mm long, obovate to cymbiform, inserted close above the bracts near the base of the pedicel, all concealed by the large, erect stipules and the subtending petiole. *Calyx* 3–4 mm long, the outer surface glabrous, the lobes shorter than the tube, all acute, the upper somewhat broader than the lower, slightly curved and united for a short distance at the base. *Petals* yellow and red, approximately equal in length. *Ovary* stipitate, glabrous, with about 6 ovules. *Pod* stipitate, oblong, glabrous, flat with thickened margin, 1.5–2.5 cm long and c. 6 mm broad. *Chromosome number* $2n=18$ (Sands, Proc. Linn. Soc. New South Wales 100 (2): 142 (1975)). Fl.: Aug.–Oct. Fr.: mostly in Oct.

DISTRIBUTION: Close to the coast, from Port Macquarie and the lower North Coast, to the Illawarra region of the Central Coast of New South Wales; often in exposed situations on sandstone formations.

NORTH COAST: Port Macquarie, Brown NSW 43950, 2.1897; Kahibah, Newcastle, Cheel NSW 43947, 9.1904. CENTRAL COAST: Morisset, Boorman NSW 43955, 10.1899; 4 miles [6 km] N. of Wyee on Doyalson-Kurri-Kurri road, Tindale NSW 55359, 8.1961; Norah Head, Constable NSW 11515, 8.1949; Tuggerah, Boorman NSW 43952, 9.1903; Woy Woy, McBarron 17523, 8.1969; Wondabyne, Blakely & Shiress NSW 43953, 10.1922; Sutherland, per Maiden NSW 43948, 8.1894; Port Hacking R., Camfield NSW 43946, 1897; Engadine, Cross NSW 3303, 10.1945; Heathcote, Fletcher NSW 43942, 9.1888; National Park, s.e. 9 & 10.1910, Maiden NSW 43957, 8.1914, Anderson & Boorman NSW 117331, 8.1921; Waterfall, Maiden NSW 43954, 8.1906; Illawarra (Bottle Forest road) Stephenson NSW 43943, (10).1886. WITHOUT PRECISE LOCALITY: ex herb. Leichhardt, NSW 43951.

15. Bossiaea riparia A. Cunn. ex Benth., Fl. Austral. 2: 166 (1864); F. Mueller, Key System Victorian Pl. 1: 217 (1888); 2: 19 (1886); Moore & Betche, Handb. Fl. New South Wales: 143 (1893); Rodway, Tasmanian Fl.: 36 (1903); Maiden & Betche, Census New South Wales Pl.: 105 (1916); Williamson in Ewart, Fl. Victoria: 661 (1931); Curtis, Stud. Fl. Tasmania 1: 143 (1956); Burbidge & Gray, Fl. Austral. Cap. Territory: 216 (1970); Willis, Handb. Pl. Victoria: 280 (1973); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — LECTOTYPE: n.v. (K); see Lee (1970).

[*B. ensata* misappl., non Sieber ex DC.: Hook. f., Fl. Tasmaniae 1: 94 (1856), at least in part.]

A low-growing erect or decumbent, almost completely glabrous shrub with more or less terete, rigid, main stems probably not more than 1 cm in diameter, and numerous, distinctly winged, spreading, lateral branches usually less than 3 mm broad. *Leaves* reduced to small scales about 1 mm long. *Flowers* 6–10 mm long, solitary or sometimes several together in the axils, on pedicels 2–4 mm long. *Bracts* usually 5 or 6 in the series, crowded in the axil, up to 1 mm long, broad-ovate to cymbiform, minutely fringed, persistent to the fruiting stage. *Bracteoles* paired, rather conspicuous, similar to the uppermost bract but larger, inserted just below the receptacle in bud but, by elongation of the pedicel, at about the middle of the pedicel or below in fruit; persistent with the bracts. *Calyx* 3–4 mm long, the outer surface glabrous, the lobes shorter than the tube, all acute or the upper pair obtuse or truncate with a lateral point, the receptacle as in *B. bracteosa*. *Petals* with standard yellow and keel and wings more or less dark red. *Ovary* shortly stipitate, glabrous, with about 4 ovules. *Pod* on a stipe about as long as the calyx or a little longer, flat, narrow-oblong to elliptical, usually 1.5 cm long with 3–4 seeds, rarely up to 2.3 cm long. *Chromosome number*: $2n=18$ (Sands, Proc. Linn. Soc. New South Wales 100 (2): 142 (1975)). Fl.: Oct.–Dec. Fr.: Dec.–Feb.

DISTRIBUTION: In the Southern Tablelands of New South Wales, and in Victoria (Grampians) and Tasmania; often at high altitudes, and in both well-watered and dry exposed situations.

SOUTHERN TABLELANDS: near falls on Cave Ck (near Fish Cave), Cooleman Caves area, *Whaite & Whaite 3474*, 6.1971; the Blue Waterholes, Cave Ck, (11 miles [18 km] NE. of Rules Point), *Rodd 887 & Coveny*, 12.1969; Cave Ck, 1 mile [1.6 km] below the Blue Waterholes, *Rodd 778*, 4.1969; Currago (at north end of stored water), Tantangara Dam, *Stead NSW 116222*, 1.1975; near Upper Nuaas Ck crossing on the Boboyan road, *Pullen 2937*, 11.1961; Monaro Shire, *Bellert NSW 100883*, 9.1963; Cooma, *Betche NSW 44162*, 12.1980, *Boorman NSW 44161*, 9.1913; Carlaminda, E. of Cooma, *Costin NSW 44163*, 10.1948.

16. *Bossiaea bracteosa* F. Muell. ex Benth., Fl. Austral. 2: 166 (1864); F. Mueller, Key System Victorian Pl. 1: 217 (1888), 2: 18 (1886); Williamson in Ewart, Fl. Victoria: 661 (1931); Burbidge & Gray, Fl. Austral. Cap. Territory: 216 (1970); Willis, Handb. Pl. Victoria 2: 280 (1973); Jacobs & Piekard, Pl. New South Wales: 119 (1981). — LECTOTYPE: MEL 20333 !; see Lee (1970).

An almost completely glabrous shrub with the habit, when well grown, of a several-stemmed small tree, up to 2.5 m high; main stems finally terete, up to about 3 cm in diameter, with numerous branches distinctly winged except when very old, these in New South Wales material and some Victorian plants, at first up to 12 mm broad, thin and flexible, with shallow nodal indentations, later up to 15 mm broad, thick and rigid, with deep indentations at the nodes. *Normal leaves* not seen but probably produced on juvenile growth or regrowth; mature stems with sealeaves, mostly 1–2 mm long, at the nodes. *Flowers* 8–10 mm long, solitary or occasionally a few together in the axils, on pedicels 1–3 mm long. *Bracts* several (c. 7) in a clearly distichous series, shortly eiliate, their bases sheathing, the uppermost 1.5–2 (–4.5) mm long and nearly as broad, persistent, sometimes to the fruiting stage. *Bracteoles* obscure, apparently represented, even in bud stages, by a pair of semicircular ridges (?) scars around the pedicel within the 2 uppermost bracts. *Calyx* 4–5 mm long, glabrous outside, the receptacle darker in colour, becoming slightly constricted in dried specimens; calyx lobes a little shorter than the tube, all nearly equal in length and usually acute but the upper pair broader. *Petals* golden yellow except for dark red colour on the keel and occasionally the wings. *Ovary* shortly stipitate, glabrous, with c. 6–8 ovules. *Pod* on a stipe slightly exceeding the calyx, flat, oblong to elliptical, 2.5–4.5 cm long, with (4–) 6–8 seeds. Fl.: Oct. Fr.: Nov.

DISTRIBUTION: Known from a few localities only, in the Central and Southern Tablelands of New South Wales, and in the Victorian Alps near Mt Hotham; recorded on slate-derived soils, and river-bank sand between boulders.

CENTRAL TABLELANDS: Abercrombie Caves, *Constable NSW 44119*, 3.1955; Abercrombie Caves, 35 miles [56 km] c. S. of Bathurst, *Constable 7514*, 10.1967. SOUTHERN TABLELANDS: Murrumbidgee and Cotter R. junction, *Cambage 2990*, 11.1911; Murrumbidgee R., 1 km downstream from Kambah Pool, *Telford 8553*, 9.1980; Shoalhaven R., 4 miles [6 km] W. of Braidwood, *Cambage 2074*, 10.1908.

17. *Bossiaea ensata* Sieber ex DC., Prodr. 2: 117 (1825); Sweet, Fl. Australasiae: t. 51 (1828); G. Don, Gen. Hist. Diehl. Pl. 2: 128 (1832); J. D. Hooker, Fl. Tasmaniae 1: 94 (1856); Bentham, Fl. Austral. 2: 167 (1864); F. Mueller, Key System Victorian Pl. 1: 217 (1888); 2: 19 (1886); Moore & Betche, Handb. Fl. New South Wales: 143 (1893); F. M. Bailey, Queensland Fl. 2: 366 (1900); Maiden & Betche, Census New South Wales Pl.: 105 (1916); Domin, Biblioth. Bot. 22 (89²): 728 (1925); Beadle, Evans & Carolin, Handb. Vase. Pl. Sydney Distr.: 254 (1963); Beadle, Evans & Carolin, Fl. Sydney Region: 301 (1972); Willis, Handb. Pl. Victoria 2: 281 (1973); Beadle, Stud. Fl. N.E. New South Wales 3: 392 (1976); Jacobs & Piekard, Pl. New South Wales: 119 (1981). — HOLOTYPE: n.v. (G), photo (NSW !); ISOTYPE: Sieber 434 (NSW !).

A diffuse erect or procumbent shrub, almost completely glabrous, usually 1 m or less in height, leafless or with a few leaves on the lower branches, the flattened, broadly winged stems usually 3–10 mm broad, the ultimate branches often 2–4 mm. *Leaves* unifoliolate, alternate, petiolate, the leaflets often almost circular, variable in size, usually seen only on juvenile growth or regrowth; mostly reduced to small sessile scales 1–2 mm long. *Flowers* 6–10 mm or rarely up to 13 mm long, solitary or sometimes several together in the axils, on slender pedicels (2–) 2.5–4 (–6) mm long. *Bracts* few in the series, usually crowded in the axil, occasionally inserted on a minute axillary branch on which the uppermost, longest, bract subtends the flower. *Bracteoles* paired, similar to the uppermost bract but slightly longer, ovate or narrow-elliptical to cymbiform, 1–1.5 mm long, inserted on the middle or lower part of the pedicel and often below the tip of the uppermost bract, almost always leaving the upper half of the pedicel exposed. *Calyx* (2.5–) 3–4 (–4.5) mm long, the outer surface glabrous, the lobes shorter than the tube, the upper two broader than the lower three, acute and curved or obtuse to truncate with a small lateral point, the lower lobes usually acute, the junction of the persistent calyx with the receptacle indicated only by a colour difference or slight ridging. *Petals* of unequal length, the standard longer than the lower petals, orange-yellow inside, red outside, the keel shortest, red. *Ovary* shortly stipitate, glabrous, with c. 8 ovules. *Pod* usually 2.5–4 cm long, on a short stipe of usually 3–4 mm, glabrous, flat, oblong. Fl.: late Winter to Spring. Fr.: mostly Sept.–Oct.

DISTRIBUTION: From southeastern Queensland through all the Coastal subdivisions and (much less commonly) the Northern and Central Tablelands of New South Wales, to eastern Victoria and eastern Tasmania; on sandy soils often deep (a common component of coastal heaths), occasionally also in exposed situations.

NORTH COAST: Bald Knob, Angourie, S. of Yamba, *McGillivray* 2715, 9.1967; c. 0.5 mile [0.8 km] E. of Minnie Water, N. of Wooli, *Disney & McGillivray* 2718, 9.1967; N. of Woolgoolga, *Conabere* 315, 10.1971; near aerodrome, Coffs Harbour, *Hayes & Tindale* NSW 82413, 8.1961, *Burgess* CBG 034885, 5.1970; South West Rocks, *Coveny* NSW 99955, 9.1967; Little Bay, Arakoon [NE. of Kempsey], *Coveny* 4231 & *Armstrong*, *Armstrong* 1, 8.1972; Tuncurry State Forest, *Burgess* NSW 56747, 7.1961; Forster, *Simson* NSW 44147, 9.1956; Nelson Bay, *Lithgow* NSW 82410, 8.1965; Newcastle, *Leichhardt* NSW 44248, 9.1842. CENTRAL COAST: Tuggerah Lakes, *Boorinan* NSW 44146, 10.1900; Bilpin, *Coveny* NSW 85562, 8.1967; Palm Beach, *Morris* NSW 44138, 9.1927; Newport, *Ford* NSW 44130, 8.1945; Faulconbridge, *Hamilton* NSW 44141, 9.1914; Woodford, *Maiden* NSW 44139, 1.1899; Pennant Hills, *Fraser* NSW 44136, 9.1928; Kogarah, *Camfield* NSW 44127, 9.1893, NSW 44128, 10.1900; La Perouse, *Lee* NSW 84989, 8.1967; Oatley, *Camfield* NSW 44121, 10.1896; Captain Cook Park, Kurnell, *Goode* 333, 9.1961; Kurnell, *Johnson* NSW 44135, 8.1946; Bundeena, *Oxenford* NSW 44134, 10.1948; Heathcote, *Fletcher* NSW 44125, 9.1887; National Park, *Camfield* NSW 44122, 10.1895, *Maiden* NSW 44123, 10.1896; Waterfall, *Camfield* NSW 44126, 12.1895; Hilltop, *Cheel* NSW 44118, 9.1912; W. Cambewarra, *Rodway* NSW 44153, 8.1930. SOUTH COAST: 3 miles [5 km] along Lighthouse road, Nowra, *Rodway* 59, 9.1930; Yerriyong, c. 8 miles [13 km] SW. of Nowra on Braidwood road, *Constable* NSW 1273A, 9.1961; Point Perpendicular, northern head of Jervis Bay, *Constable* NSW 53075, 10.1960; Jervis Bay, *Rodway* NSW 44154, 9.1915, *Eilert* NSW 82412, 9.1962; Conjola, *Heron* NSW 44152, 10.1898; Mogo State Forest, c. 4½ miles [7 km] SW. of Batemans Bay, *Lee* 55, 11.1970; near Burrawarra Point, S. of Batemans Bay, *Craven* 633, 10.1965. NORTHERN TABLELANDS: Torrington, *Boorman* NSW 44120, 10.1911. CENTRAL TABLELANDS: Kekeelbon Mts, ¼ miles [2 km] SE. of "Three Ways" along Putty fire trail, *Wliaite* 3293, 9.1969; Mt Wilson, *Maiden* NSW 44140, 10.1899; Blackheath, *Hamilton* NSW 44144, 11.1914, per *Wyer & Rodway* NSW 44143, 12.1947; Kings Tableland, *Coveny* NSW 85310, 8.1967; Leura, *Hamilton* NSW 44142, 9.1914, NSW 44145, 1.1915. WITHOUT PRECISE LOCALITY: *Sieber* 434, Fl. Novac Holl.; *Tilden* 583, 1913.

B. ensata is superficially very similar to *B. scolopendria* but is distinguished by its smaller calyx (and flower), longer pedicel with smaller bracteoles inserted lower, the junction of its fruiting calyx with the receptacle not strongly marked, its lax and often decumbent habit (but nearly erect with cladodes more numerous in coastal dune habitats), and its narrower ultimate branches.

18. Bossiaea scolopendria (Andr.) Sm., Trans. Linn. Soc. 9: 303 (1808); Sims, Bot. Mag. 30: t. 1235 (1809); R. Brown in W. T. Aiton, Hortus Kew. edn 2, 4: 267 (1812); Candolle, Prodr. 2: 116 (1825); Loddiges, Bot. Cab. 18: t. 1747 (1831); G. Don, Gen. Hist. Dichl. Pl. 2: 128 (1832); F. Mueller, Fragm. 3: 95 (1862) — Mueller here gives a description and distribution which indicate that he is including *B. riparia*, *B. ensata*, *B. bracteosa* and perhaps *B. rufa*, in *B. scolopendria*; Bentham, Fl. Austral. 2: 167 (1864); Moore & Betche, Handb. Fl. New South Wales: 143 (1893); Maiden & Betche, Census New South Wales Pl.: 105 (1916); Beadle, Evans & Carolin, Handb. Vasc. Pl. Sydney Distr.: 254 (1963); Beadle, Evans & Carolin, Fl. Sydney Region: 301 (1972); Beadle, Stud. Fl. N.E. New South Wales 3: 392 (1976); Jacobs & Pickard, Pl. New South Wales: 118 (1981). — *Platyllobium scolopendrium* Andr. (basionym), Bot. Repos. 3: t. 191 (1801); Ventenat, Jard. Malm. t. 55 (1804). — TYPE: n.v.; see Lee (1970).

An erect, sparsely branched, almost completely glabrous shrub up to 1.5 m or occasionally more in height, leafless or with a few leaves on the lower branches, the major cladodes few, often 6–10 mm broad, the ultimate branches 4–6 mm or more. Leaves unifoliolate, alternate, petiolate, the leaflets often ovate to almost circular, variable in size, usually seen only on juvenile growth or regrowth and later replaced by small scales 1–2 mm long. Flowers 1–1.4 cm long, solitary, or occasionally several together, in the axils, on rather stout pedicels (1–) 2 (–3) mm long. Bracts few in the series, crowded in the axil, fringed at least apically, the uppermost usually 2–2.5 mm long and notably longer than the lower ones, finally glabrous and more like the bracteoles in size and appearance, persistent to the fruiting stage. Bracteoles glabrous, usually 2–2.5 mm long, narrow-ovate or elliptical, cymbiform, inserted near the middle of the pedicel often below the tip of the uppermost bract, at first covering the upper pedicel and receptacle (the receptacle sometimes later exposed), persistent. Calyx 4–6 mm long, the outer surface glabrous, the lobes equal to or shorter than the tube, the upper much broader than the lower, acute and curved, or obtuse or almost truncate with a small lateral point, united for much of their length, the lower lobes acute. Petals of unequal length, coloured as in *B. ensata*, the standard much longer than the lower petals, the keel very short. Ovary shortly stipitate, glabrous, with usually 8–10 ovules. Pod glabrous, flat, oblong, usually 3–5 cm long, on a stipe as long as the calyx, the margins woody when old, the base of the persistent calyx finally retracted over the receptacle, forming a distinct collar. Chromosome number: $2n = 18$ (Sands, Proc. Linn. Soc. New South Wales 100 (2): 142 (1975)). Fl.: mostly Aug.–Sept. Fr.: mostly Oct.

DISTRIBUTION: In the Central and the northern part of the South Coast of New South Wales; in heath, scrub or dry sclerophyll forest, especially of the Triassic Hawkesbury Series.

CENTRAL COAST: Somersby, McGillivray 732, 10.1958; Gosford, Purser NSW 44230, 9.1899; Cowan, Anderson & Boorman NSW 44232, 8.1921, de Benzeville NSW 96247, 12.1931; Bobbin Head, Constable NSW 27301, 8.1948; Kuringai Chase National Park, near Salvation Ck, along West Head road, Armstrong 187, 8.1973; Terrey Hills, Burgess B248, 9.1973; Elouera Bushlands Reserve, W. of Hornsby, Coveny NSW 127714, 8.1967; Wahroonga, Salasoo 720, 8.1951; St Ives, Blakely NSW 44208, 9.1936; Frenchs Forest, Rodway 1924, 9.1930, Garden NSW 7280, 8.1948; Pennant Hills, Fraser NSW 44233, 10.1927; off Purchase road, West Pennant Hills, Mowle 108, 9.1961; Cheltenham, Hudson NSW 117332, 8.1914; Roseville, Morris NSW 44243, 9.1924; Manly, Boorman NSW 44212, 8.1903; Ignatius NSW 44210, 9.1943; Middle Harbour, Dixon NSW 44244, 8.1903; Mosman, ex Hawkesbury Agric. Coll. NSW 148001, 10.1903; Field of Mars, Gladesville, Boorman NSW 44245, 8.1915; North Shore [Port Jackson], Leichhardt NSW 44241, 7.1842, 11.1842 (mixed collection); Rose Bay, Helms NSW 44216, 10.1900; North Bondi, Johnson NSW 44215, 10.1945; La Perouse, Lee NSW 84990, 8.1967; Botany Bay, Camfield NSW 44223, 8.1899; Kogarah district, Camfield NSW 44221, 9.1900; Kogarah Bay, Camfield NSW

44219, 8.1893; Carlton to Tom Uglys Point, *Camfield NSW* 44222, 8.1902; Oatley, *Fletcher NSW* 44228, 8.1887, *Camfield NSW* 44227, 11.1901, *NSW* 44224, 8.1902; Oatley railway, *Camfield NSW* 44226, 8.1897, *NSW* 44229, 8.1900; Sydney, *Backhouse* [as *Blackhouse*] 756, 1835, *Hooker NSW* 44240, 1841. SOUTH COAST: Pacific City, Jervis Bay, *Rodway NSW* 44237, 9.1927; between Turpentine Ck and headwaters of Gnatilia Ck, c. 12 km ENE. of Sassafras, *Crisp 1169*, 9.1975; Turpentine Range, 15 miles [24 km] SW. of Nowra, *Constable 7435*, 9.1967; Turpentine Range, 20 miles [32 km] SW. of Nowra, *Hadley per Rodway 2812*, 7.1928.

B. scolopendria is very similar to, but maintains its distinctness from, *B. ensata* q.v.

19. *Bossiae walkeri* F. Muell., Fragm. 2: 120 (1861); 9: 44 (1875); Bentham, Fl. Austral. 2: 167 (1864); Tate, Handb. Fl. Extratrop. South Australia: 65 (1890); Moore & Betche, Handb. Fl. New South Wales: 143 (1893); Maiden & Betche, Census New South Wales Pl.: 105 (1916); Gardner, Enum. Pl. Austral. Occid.: 61 (1930); Diels & Pritzel, Fragm. Phytogr. Austral. Occid.: 263 (1904); Black, Fl. South Australia 2: 304 (1924), cdm 2, 2: 445 (1948); Beard (ed.), Descriptive Cat. W. Australian Pl. edn 2: 64 (1970); Willis, Handb. Pl. Victoria 2: 280 (1973); Jacobs & Pickard, Pl. New South Wales: 118 (1981); Cunningham et al., Pl. W. New South Wales: 385 (1981). — HOLOTYPE: MEL 20337 !; see Lee (1970).

A rigid, much-branched shrub usually 1 m or more in height, commonly regenerating from roots, almost completely glabrous, with flattened leafless stems usually 3–7 mm wide and often with a white waxy surface. Leaves reduced to small scales approximately 2 mm long. Flowers 2–2.5 cm long, solitary in the axils, on pedicels up to 5 mm long. Bracts several in the series, reddish, closely distichous on a scarcely perceptible axillary branch, the bracts up to 3 mm long, glabrous except for a marginal fringe. Bracteoles paired, similar to the upper bracts and inserted below their tips, but up to 3.5 mm long, ovate to oblong, very readily deciduous leaving distinct scars. Calyx approximately 1 cm long, glabrous outside, the lobes shorter than the tube, the upper somewhat broader than the lower, usually obtuse and united for much of their length, the lower lobes acute or obtuse. Petals red, of unequal length, the standard much shorter than the lower petals, the keel about 2 cm long. Ovary shortly stipitate, with some hairs on the margins and about 20 ovules. Pod on a stipe as long as the calyx, glabrous, oblong, c. 6 cm long. Chromosome number: $2n=18$ (Sands, Proc. Linn. Soc. New South Wales 100 (2): 142 (1975)). Fl.: mostly Jul.–Sept. Fr.: irregular.

DISTRIBUTION: In the Western and Far Western Plains of New South Wales, and in similar parts of northwestern Victoria, South Australia and inland Western Australia; frequently in mallee associations, in creek beds and banks, deep red sand of dunes, and on rocky outcrops and ridges.

NORTH WESTERN PLAINS: Byrock, *Boorman NSW* 44202, 11.1903; Cobar, *Boorman NSW* 44199, 5.1918, *Abrahams NSW* 44194, 8.1911, *Curran NSW* 44195; 2 miles [3 km] N. of Mt Lewis, near Canbelclego, *Cunningham 2716 & Milthorpe*, 8.1974; between Canbelclego and Nymagee, *McReaddie NSW 55315*, 5.1961; 30 miles [48 km] WSW. of Nyngan, *Burrows NSW* 44204, 10.1938; 41 miles [66 km] S. of Cobar on road to "Lerida", *Moore 4469*, 9.1966. SOUTH WESTERN PLAINS: Cobb Hwy, 10 km S. of "Fairmont", 50 km S. of Wilcannia, *Pickard 2328*, 7.1973; Nymagee, *Cogger NSW 57952*, 9.1962; c. 4 miles [6 km] W. of Nymagee, *Lee 164*, 3.1968; on flats N. of Shattoleton Mine near Cobar, *Haviland NSW 44198*, 12.1915; Shattoleton, near Nymagee, *Walker CANB-ANU. 1288*, 2.1964; 101 miles [162 km] N. of Hillston on Cobar road, past Sandy Cl. Tank, *Whaite & Whaite 2751*, 9.1963; Yathong Nature Reserve, *Brickhill 606-3*, 7.1977; "Bundure" Station, N. of Mt Hope, 32° 50' S, 146° 00' E, *Martensz 158*, 5.1969; 25.5 km NW. of Condobolin on Tallebung road, *Lander 27*, 9.1971; 31 miles [50 km] N. of Hillston on Cobar road, *Whaite & Whaite 2729*, 9.1963; near Condobolin, *Hudson NSW 84859*, 5.1964; [Lake] Cargelligo [as 'Cudgellico via Condobolin'], *Horan NSW 44196*, 1.1913; Laelhan district, *Duff NSW 44205*, 1882; Naradhan, *Mitchell NSW 53028*, 11.1960; Weethalle, *Hill NSW 102440*, 7.1968; Griffith-Rankin Springs road, *Withers NSW 44203*, 8.1950; Nericon, *Wallin NSW 53031*, 9.1960; "Nericon Farm", *Nericon, Wallin NSW 53032*, 3.1960; Griffith, *Shiress NSW 44197*, 8.1924; "Lake View", Griffith, *Campbell NSW 44201*, 4.1918. SOUTH FAR WESTERN PLAINS: No Mans Land, E. of Pooncarie, *Giles 33*, 11.1977; 12 miles [19 km] E. of Turlee, ENE. of Mildura, *Briggs 2796 & Johnson, 5.1969*.

20. PLATYLOBIUM Sm.[†]

Specimen Bot. New Holland: 17, t. 6 (1793).

[Gk. *platys*, flat; *lobos*, pod; form of the fruit.]

Literature: Lee (1970, 1973); Polhill (1976); Sands (1975); Thompson (1961); see page 178.

Shrubs or subshrubs, occasionally prostrate, with slender, terete stems from a woody rootstock. *Leaves* opposite, or occasionally alternate, obscurely unifoliolate, sessile or petiolate, entire (as in the New South Wales species) or with pungent-pointed angles; stipules ovate to narrow-ovate, striate; stipellae absent. *Flowers* solitary or several together in the axils, on long slender pedicels or almost sessile, occasionally paired on a short peduncle, the *bract* (interpreted as the uppermost and longest of a series of reddish, scarious and distichous scales, decreasing in size downwards) at the base of the pedicel near, or in one species well removed from, the receptacle. *Calyx* pubescent, the three lower lobes narrow and acute, the upper pair very much longer, broadly rounded, and usually united for less than half their length. *Petals* clawed, mostly orange-yellow and red but the keel often purplish, the standard orbicular or reniform, the wings oblong-ovate and much shorter than the standard, the keel obtuse and almost as long as the wings. *Stamens* 10, all united in sheath open on the adaxial (upper) side, the anthers uniform, dorsifixed. *Ovary* pubescent, ciliate or glabrous, sessile or stipitate, with a slender style and terminal stigma. *Pod* flat, winged along the upper suture, dehiscent by recurring of the valves to show a glossy interior surface. *Seeds* several, with a hooded, cap-like aril, and slender, curved radicle. *Platylobium* is distinguished from *Bossiaea* essentially by the 'winged' pod.

A genus of 4 species endemic in Australia, one species in New South Wales.

Platylobium formosum Sm., Specimen Bot. New Holland: 17, t.6 (1793) — although Smith implied here that his description had already appeared in Trans. Linn. Soc. 2: 350 (1794), his paper had in fact been read to that Society on 5.xi.1793, but its publication did not ensue until 1794; J.D. Hooker, Fl. Tasmaniae 1: 96 (1856); Bentham, Fl. Austral 2: 153 (1864); Spicer, Handb. Pl. Tasmania: 55 (1878); F. Mueller, Key System Victorian Pl. 1: 217 (1888), 2: 18 (1886); Moore & Betche, Handb. Fl. New South Wales: 141 (1893); F.M. Bailey, Queensland Fl. 2: 362 (1900); Rodway, Tasmanian Fl.: 36 (1903); Sulman, Wildfl. New South Wales 1: 116, Pl. 34 (i) (1913) and edn 2 (1926); Domin, Biblioth. Bot. 22 (89²): 727 (1925); Williamson in Ewart, Fl. Victoria: 660 (1931); Curtis, Stud. Fl. Tasmania 1: 141 (1956); Beadle, Evans & Carolin, Vase. Pl. Sydney Distr.: 253 (1963); Burbidge & Gray, Fl. Austral. Cap. Territory: 213 (1970); Beadle, Evans & Carolin, Fl. Sydney Region: 300 (1972); J.H. Willis, Handb. Pl. Victoria 2: 178 (1973); Beadle, Stud. Fl. N.E. New South Wales 3: 392, fig. 175A (1976); Jacobs & Pickard, Pl. New South Wales: 125 (1981). See also under the subspecies. — TYPE: n.v.; see Lee (1970).

A slender, rather straggling shrub often attaining 2 m in height, occasionally taller, or prostrate, the stems glabrous, or with long, fine hairs, or minutely scabrid from the persistent bases of these. *Leaves* opposite or occasionally alternate, sessile or shortly petiolate, narrow-ovate to very broad-ovate-cordate, pungent or mucronate, 1–6.5 cm long and often 1.5–2 cm broad, with entire margins, recurved or flat, the upper surface reticulate, glabrous or minutely scabrid, the lower paler, glabrous or with sparse, fine hairs. *Stipules* persistent, ovate or narrow-ovate,

[†]by A.T. Lee and J. Thompson.

acuminate, usually 2–5 mm long, reddish to dark brown, striate, becoming reflexed. *Flowers* 8–15 mm long, solitary or clustered in the axils, the pedicels slender, pubescent, usually with long, fine hairs, very short or up to 2 cm or more in length. *Bracts* usually ciliate, up to 4 mm long. *Bracteoles* 3–5 mm long, usually narrow-ovate, often somewhat pubescent, on the upper part of the pedicel. *Calyx* 5–10 mm long, pubescent with long, spreading or appressed, often ferruginous hairs. *Ovary* stipitate, glabrous or pubescent, with about 8 ovules. *Pod* long-stipitate, glabrous or with some pubescence at least on the sutures, oblong to broad-oblong, mostly 2–4 cm long, and up to 2 cm broad. *Chromosome number*: $n = 8$, $2n = 16$ (Sands, Proc. Linn. Soc. New South Wales 100 (2): 142 (1975)).

DISTRIBUTION: Coastal areas from southeastern Queensland to Tasmania, and in the ranges and slopes of southern New South Wales and Victoria.

The species shows some differentiation into two subspecies, ssp. *formosum*, a relatively uniform taxon in the southwestern part of the species range, and ssp. *parviflorum*, more variable and chiefly in the eastern, coastal parts of that range. This treatment follows Lee (1970) but the species shows a complex pattern of variation, and other complexities (J. Ross, pers. comm. 1982) suggesting that the taxa need further study.

1. Leaflets generally ovate-cordate, indented to straight or scarcely tapered at the base, in length not more than twice the breadth. Ovary long-haired on the sides and edges, or very densely along the edges. Fruit pubescent on the sutures and retaining some pubescence on the valves ssp. *formosum* a.
- 1.* Leaflets generally narrow-ovate, not cordate, rarely almost straight across the base, in length more than twice the breadth. Ovary glabrous, or, usually scantily, pubescent on the sutures only. Fruit glabrous or almost so ssp. *parviflorum* b.

a. **P. formosum** ssp. *formosum*; A. Lee, Contr. New South Wales Natl. Herb. 4(3): 97 (1970).

P. formosum Sm., Trans. Linn. Soc. 2: 350 (1794); Curtis, Bot. Mag. 14: t. 469 (1800); Willdenow, Sp. Pl. edn 4, 3 (2): 921 (1802); Ventenat, Jard. Malm.: n. 31 (1804); Smith, Trans. Linn. Soc. 9: 302 (1808); R. Brown in W.T. Aiton, Hortus Kew. edn 2, 4: 266 (1812); Candolle, Prodr. 2: 116 (1825); Paxton, Mag. Bot. 13: 195 (1846); Bentham, Fl. Austral. 2: 153 (1864); Maiden & Betche, Census New South Wales Pl.: 104 (1916); Jacobs & Pickard, Pl. New South Wales: 125 (1981). —*P. formosum* var. *typicum* Domin, Biblioth. Bot. 22 (89²): 728 (1925), *nomen inval.*; see also under the species.

Diagnostic characters as given in the key. Leaflets (1–) 3–3.5 (–5) cm long, (1–) 2 cm broad, the length up to twice the breadth, rarely more. Fl.: Spring, mostly Sept.–Oct.

DISTRIBUTION: North and Central Coast, Central and Southern Tablelands, and South Western Slopes of New South Wales, extending into the ranges and slopes in Victoria, and less commonly along the coast from (?) Queensland to Tasmania; in sheltered situations on soils derived from shales and sandstones.

NORTII COAST: Seal Rocks, Fox 7907033, 7.1979; Tahlee, Port Stephens, Constable NSW 45271, 10.1956. **CENTRAL COAST:** 1 mile [1.6 km] N. of Colo Heights, Tindale NSW 48850, 11.1959; Terrigal, Carne NSW 100804, e. 1912; Wondabyne, Blakely NSW 42956, 9.1938; Warrah Reserve, Pearl Beach road, Mair NSW 100800, 3.1966; Palm Beach isthmus, Goode 373, 9.1961; Church Point, Fraser NSW 42908, 9.1927; Bay View, Constable NSW 5303, 1.1948; Hornsby, Fletcher NSW 42940, 9.1886; Collaroy, Ford NSW 42913, 7.1946; Frenchs Forest, Rodway NSW 42926, 9.1933; Seaforth, Constable NSW 11461, 11.1949; Manly, Helms NSW 17908, 11.1901, Camfield NSW 42920, 9.1893; Middle Harbour, Camfield NSW 42955, 11.1897; Port Jackson district, Harvey NSW 42936, e. 1850; Rose Bay, Helms NSW 17909, 8.1901; Bellevue Hill, Camfield NSW 42909, 10.1896; Como, Camfield NSW 42919, 10.1897*; near Berry

*atypical specimen, showing some characters of ssp. *parviflorum*

Beach, Whaite & Whaite 2831, 10.1964; Nowra North, Constable NSW 16319, 12.1950. SOUTH COAST: Nowra Ck, Rodway NSW 42906, 12.1916; 4 miles [6 km] S. of Nowra, on S. Coast road, Rodway 18, 9.1930; Yerriyong, c.8 miles [13 km] SW. of Nowra on Braidwood road, Constable 1272A, 9.1961; Jervis Bay, Rodway NSW 42925, 9.1915, NSW 42924, 12.1915; W. of and close to Princes Hwy near Narrabarba, Lee NSW 144323, 1.1974. CENTRAL TABLELANDS: Springside via Orange, Giles NSW 42941, 9.1950; Gulf Stream, Winburndale Nature Reserve, 20 km E. of Bathurst, Coveny 9621, 10.1977; Rydal, c. 8 km W. of Lithgow, Morris NSW 42958, 10.1924; Luggan to Tuena, Moore 2681, 10.1953; between Binda and Bigga, Moore 2665, 10.1953; Taralga to Wombeyan Caves, near Richlands, Moore 2635, 10.1953. SOUTHERN TABLELANDS: Sugarloaf Ck road, 35° 06' S, 148° 34' E, Pullen 10962, 10.1977; Tumut, Breakwell NSW 42915, 10.1912, Morkland NSW 42953, 12.1947; Two Sticks road, above Brindabella Valley, A.C.T., Burbidge 7280 bis, 7283, 11.1961; Brindabella road, Gauba NSW 100799, 9.1950; Braidwood to Mongarlowe, Cambage 2038, 10.1908; Batlow, Boorman NSW 42951, 10.1916; Quartzville, Forsyth NSW 42933, 11.1900; Laurel Hill, Herrington NSW 63296, 6.1963; Yarrangobilly, Vickery NSW 42959, 1.1940; Buddong Falls [e. 16 km SSW. of Talbingo], Ellens NSW 42918, 5.1917; Bago Forest Reserve, de Beuzeville NSW 42931, 1.1917; ... Bago State Forest, Muir 2398, 10.1961; Ravine, lower Yarrangobilly R., e. 1 mile [1.6 km] by road S. of river, Rodd 970 & Coveny, 12.1969; 10 miles [16 km] S. of Tumbarumba, Dwyer NSW 42932, 12.1921; Seamills Spur Lookout, Khaneoban to Geehi, Salasoo 3541, 1.1969; 1 mile [1.6 km] S. of Geehi R. crossing (c. NW. of Mt Kosciusko), Ford NSW 144324, 1.1959; ... road junction on Alpine Way, Snowy Mts, 550 m alt., Raine ANU 10369, 11.1971. SOUTH WESTERN SLOPES: Gilmore, near Tumut, Boorman NSW 42952, 10.1916; Tabletop Nature Reserve, 23 km S. of Culcairn, Bricknell 110, 10.1978; Albury, Frauenfelder NSW 42934, 9.1917. Dwyer NSW 42954, 8.1918, NSW 42946, 8.1921, per Hawkesbury Agric. Coll. NSW 144325, 10.1905. WITHOUT PRECISE LOCALITY: Sieber 373, Fl. Novae Holl.; NSW 42937, ex herb. Dixon.

b. *P. formosum* ssp. *parviflorum* (Sm.) A. Lee, Contr. New South Wales Natl. Herb. 4(3): 96 (1970). — *Platylobium parviflorum* Sm. (basionym), Specimen Bot. New Holland: 18 (1793); Willdenow, Sp. Pl. edn 4, 3(2): 921 (1802); Smith, Trans. Linn. Soc. 9: 302 (1808); R. Brown in W.T. Aiton, Hortus Kew. edn 2, 4: 266 (1812); R. Brown in Sims, Bot. Mag. 37: t. 1520 (1813); Candolle, Prodr. 2: 116 (1825); Loddiges, Bot. Cab. 13: t. 1241 (1827); Jacobs & Pickard, Pl. New South Wales: 125 (1981). — *P. formosum* var. *parviflorum* (Sm.) Benth., Fl. Austral. 2: 154 (1864); Maiden & Betche, Census New South Wales Pl.: 104 (1916); Domin, Biblioth. Bot. 22 (89²): 728 (1925); see also under the species. — TYPE: n.v.; see Lee (1970).

[*P. ovatum* misappl., non Andr.: Candolle, Prodr. 2: 116 (1825), based on Sieber 374 (NSW !).]

Characters as given in the key. Leaflets (1-) 3.5–4.5 (–6) cm long, (1-) 1.5–2 (–2.5) cm broad, the length at least twice the breadth, Fl. Spring, mostly Aug.–Sept.

DISTRIBUTION: Widespread in all the Coastal subdivisions of New South Wales, but reaching the Tablelands only in the Blue Mountains (Central Tablelands); also in Queensland and Tasmania, but not yet recorded for Victoria; habitats as for ssp. *formosum*.

NORTH COAST: New Italy, 29° 08' S, 153° 06' E, Constable 6437, 11.1965*; Bellinger R., Swain NSW 42961, 9.1910; Newry State Forest (between Nambucca and Bellingen), Floyd & Tindale NSW 76861, 8.1961; [Trial Bay] 1.2 miles [1.9 km] from lighthouse going towards Arakoun, Armstrong 8, 8.1972*; Bellangry, Lane NSW 42928, 9.1956*; Port Macquarie, Brown NSW 42942, 2.1897*; Kendall, Bailey NSW 42945, 9.1932*; Johns R., Boorman NSW 42938, 8.1918*; Smiths Lake, S. of Forster, Salasoo 3249, 1.1967*; Fiona Beach, 5 miles [8 km] S. of Forster, Constable 1289, 10.1961*. CENTRAL COAST: Iluka Road, Ocean Beach, Rodd & Tindale NSW 144329, 10.1968*; near Kuring-gai, Morris 1199, 9.1924; Hornsby, Blakely NSW 42963, 8.1914; Wahroonga, Camfield NSW 42964, 8.1898; Cumberland State Forest, West Pennant Hills, Coveny 8614, 10.1976; Pennant Hills, Vickery NSW 42947, 9.1936, Fraser NSW 42910, 10.1927; Beecroft, Carne NSW 42960, 11.1914; Cheltenham, Hudson NSW 144322, 8.1914, Johnson NSW 42922, NSW 42923, 8.1946; Epping, Cross NSW 42944, 9.1932, Ford NSW 42914, 8.1946, NSW 4418, 9.1947; East Epping (Devlins Ck), Johnson NSW 42921, 10.1945; Field of Mars, Gladesville, Boorman NSW 42949, 8.1914; Hunters Hill, Carne NSW 144326, 8.1905; Lindfield, Dixon NSW 42939, 8.1903; Lindfield fire trail towards Lane Cove National Park, Seur 300, 9.1975; Abbotsford, Rupp NSW 42948, 9.1915; Kogarah, Camfield NSW 42957, 11.1899. SOUTH COAST: 1 mile [1.6 km] S. of Pigeon House Mtn, e. 1450' [e. 440 m] alt., Salasoo 4815, 10.1971*; Jervis Bay, Gauba 001362, 9.1951; Nerrigundah, Boorman NSW 42917, 8.1917*; Bermagui, Dunn NSW 42929, 9.1915.

*atypical specimen, showing some characters of ssp. *formosum*

NSW 42930, 8.1917; track to Mt Imlay, c. 20 km SW. of Eden, Coveny 5795 & Armstrong, 10.1974; Green Cape Lighthouse road, Constable NSW 30259, 10.1954*; Carlyle Trig., 5 miles [8 km] WNW. of Cape Howe, Constable 4377, 8.1963. CENTRAL TABLELANDS: Katoomba Falls to Leura Falls, Salasoo 2142, 10.1961; Wentworth Falls, Hamilton NSW 76860, 1.1915; Mt Solitary, 5 miles [8 km] S. of Katoomba, Constable NSW 52796, 11.1960. WITHOUT PRECISE LOCALITY: Caley NSW 144328, 1799-1810; Sieber 374, Fl. Novae Holl.; Waterfall, Leichhardt NSW 42962, August.

21. GOODIA Salisb.[†]

Paradisus Lond.: t. 41 (1806)

[After Peter Good, Collector with Robert Brown on H.M.S. "Investigator", died at Sydney, 1803.]

Literature: Lee (1973); Polhill (1976); Sands (1975); Thompson (1961); Williamson (1930); see page 178.

Shrubby plants, often more than 1 m in height. *Leaves* alternate, pinnately trifoliolate, the leaflets entire; stipules ovate, membranous, so readily deciduous as to be rarely seen but leaving distinct scars; stipellae absent. *Flowers* in terminal and leaf-opposed racemes, each flower subtended by a single bract and a pair of bracteoles, the bracts and bracteoles similar to the stipules, membranous, pubescent or glabrous, very readily deciduous and seen only in very young bud stages but leaving distinct scars. *Calyx* glabrous or pubescent, the lobes acute, equal to or shorter than the tube, the upper pair largely united to form a broad, two-lobed lip. *Petals* clawed, yellow with parts in red to purplish black, the standard more or less circular, the wings narrow and longer than the broad, incurved, obtuse keel. *Stamens* 10, all joined in a sheath open on the upper side, the anthers equal in length, all dorsifixcd, with a broad, brown connective. *Ovary* stipitate, glabrous or pubescent, separated from the androecium by a saucer-shaped disc, the style slender, curved up to a small terminal stigma; ovules 4 or fewer. *Pod* long-stipitate, flat, the valves with thickened margins, the upper suture with a strong, submarginal vein. *Seeds* with a conspicuous hooded aril and a rather thin, curved radicle; often only 1-3 maturing in the fruit.

A genus of two species, endemic in southern mainland Australia, both present in New South Wales. A third taxon occurs in Tasmania, where it is recognized as *G. pubescens* Sims, and in Victoria where it is known as *G. lotifolia* var. *pubescens* (Sims) Williamson.

The status of taxa in *Goodia* has long been in question, and current classifications recognize only one, or as many as three different species in the whole population. The distinctness of the taxa relevant to this Flora, *G. lotifolia* Salisb. and *G. medicaginea* F. Muell., has always been obscured because the traditional diagnostic characters, already somewhat inexact, are rarely displayed simultaneously on the specimen. This has prevented a reliable assessment of the correlation of the characters and their value for diagnosis, since those of the calyx can be observed satisfactorily only at flowering stages when those of the fruit and seed are not yet available. Even the newly-recognized bark character may be affected by maturity of the stem to a degree not yet clear. Nevertheless, use of this extra character has verified correlation of the others to a considerable degree.

The status of *G. pubescens* Sims remains in doubt; it is noteworthy that the Tasmanian populations referable to this name exhibit some characters of *G. lotifolia* in combination with others of *G. medicaginea*; similarity in flower, fruit, seed and

[†] by A.T. Lee

inflorescence suggests a close relationship between *G. pubescens* and *G. lotifolia*, but smaller stature and more condensed habit are common to *G. pubescens* and *G. medicaginea*.

1. Calyx teeth of the lower lip at least equal to the tube in the fully mature flower; pod usually 2.5 cm or more in length, predominantly grey-black; foot of the seed aril c. 1.5 mm long, the hilum linear; bark on older stems pale or dark, relatively smooth, with or without longitudinal ridges *G. lotifolia* 1.
- 1.* Calyx teeth of the lower lip usually shorter than the tube in the fully mature flower; pod usually less than 2.3 cm, often less than 2 cm long, light brown; foot of the seed aril 1 mm or less in length, the hilum elliptical; bark on older stems dark reddish to black, relatively rough with longitudinal and usually some transverse ridging *G. medicaginea* 2.

1. *Goodia lotifolia* Salisb., *Paradisus Lond.* 1 (2): t. 41 (1806); Sims, *Bot. Mag.* 24: t. 958 (1806); R. Brown in W. T. Aiton, *Hortus Kew.* edn 2. 4: 269 (1812); Loddiges, *Bot. Cab.* 7: t. 696 (1822); Candolle, *Prodr.* 2: 117 (1825); J. D. Hooker, *Fl. Tasmaniæ* 1: 97 (1856); F. Mueller, *Fragsm.* 1: 10 (1858), 9: 157 (1875); Bentham, *Fl. Austral.* 2: 177 (1864) in part; Moore & Betche, *Handb. Fl. New South Wales*: 145 (1893); F. M. Bailey, *Queensland Fl.* 2: 370 (1900); Rodway, *Tasmanian Fl.*: 38 (1903); Maiden & Betche, *Census New South Wales Pl.*: 105 (1916); Williamson, *Victorian Naturalist* 47: 111 (1930); Williamson in Ewart, *Fl. Victoria*: 658 (1931); Black, *Fl. South Australia* edn 2, 2: 447 (1948) in part; Curtis, *Stud. Fl. Tasmania* 1: 144 (1956); Beadle, Evans & Carolin, *Handb. Vasc. Pl. Sydney Distr.*: 254 (1963), *Fl. Sydney Region*: 302 (1972); Willis, *Handb. Pl. Victoria* 2: 282 (1973); Beadle, *Stud. Fl. N.E. New South Wales* 3: 395, t. 176A (1976); Jacobs & Pickard, *Pl. New South Wales*: 122 (1981). — TYPE: n.v.; Salisbury's illustration in the protologue has been taken (from the calyx character) to identify the type with the traditional concept of *G. lotifolia* adopted here.

[Most authors treating the flora of Western and South Australia have used the name *G. lotifolia* to include *G. medicaginea* q.v.; also the voucher for chromosome number given by Sands (1975), and that of Polhill (1976) for character of the hilum in *Goodia*, are specimens of *G. medicaginea* from Western Australia misnamed *G. lotifolia*.]

A shrub, often 2–3 (–4) m in height, with uncrowded foliage, the stems glabrous, or pubescent (especially on the younger parts). Bark on older stems (i.e. those a little remote from currently flowering branches) often pale, sometimes reddish to black, and with shallow longitudinal ribbing but sometimes with deeper, sparsely reticulating and close longitudinal ridges (especially in specimens from subcoastal valleys in Victoria, east and west of Port Phillip). Leaflets 3, obovate to obovate-cuneate, sometimes emarginate, usually 1–3 cm long, glabrous or sometimes quite densely pubescent (more so on the lower surface), thin in texture, darker above than below, the terminal remote from the laterals, the petiole slender, the stipules, bracts and bracteoles as for the genus. Inflorescence a raceme, usually at least 8 cm long, the flowers (9–) 10 (–13) mm long, on slender pedicels of c. 5 mm. Calyx 4–6 mm long above the receptacle of 1 mm, glabrous or with sparse, appressed hairs, or occasionally with denser pubescence; upper lip of 2 broadly triangular, partly joined teeth with median points; teeth of the lower lip (at full flowering) triangular (length:breadth = 2:1) or narrower, often with incurved margins, the middle one longest by a little and at least equal in length to the tube. Petals yellow, with parts red to almost black. Ovary glabrous or with some fine hairs, and up to 4 ovules. Pod (2–) 2.5–2.8 cm long, glabrous or glabrescent, tapering at the base to a long, slender stipe, obliquely ovate to oblong but varying in outline with the number and position of seeds maturing, dingy greenish to grey-

black in colour, with prominent transverse reticulating veins. Seeds usually only 1–3 maturing, with a hooded, cap-like aril; divided foot or base of the aril at least 1.5 mm long encircling a linear hilum. Chromosome number: see *G. medicaginea*. Fl.: Spring, mostly Sept.–Oct. Fr.: mostly Dec.

DISTRIBUTION: Widespread and sometimes locally frequent in southeastern Australia, from southern Queensland through the Coast and Tablelands of New South Wales to Victoria and Tasmania, and into southeastern South Australia including the Flinders Ranges (apparently relict occurrences); often seen in disturbed-soil situations, and to that extent a pioneer species growing quickly and perhaps short-lived; soil preferences uncertain, but basalt (often), quartzite, slate and sandstone are recorded, often in sheltered valley and rainforest margin habitats.

NORTH COAST: Border Gate, Mt Lindesay, *Whaite* 252, 8.1949*; Mt Lindesay, *Forsyth* NSW 45668, 9.1900*; track to Nothofagus Mtn, c. 7 miles [11 km] N. of Woodenbong, *Coveny* 5172, 9.1973; Richmond R., NSW 45678; Gibraltar Ra., 49 miles [79 km] E. of Glen Innes, *Williams* & *Winterhalder* 598, 10.1958; c. 2 km along Washpool Forest Way from Gwydir Hwy, Gibraltar Range National Park, *Armstrong* 556, 11.1973; c. 20 miles [32 km] E. of Bald Nob, *Salasoo* 4665, 1.1971; Whitemans Ck, 8 miles [13 km] E. of Ramornie, *Blakely* & *Shires* NSW 45677, 7.1922; Colfs Harbour, *Maiden* & *Boorman* NSW 45673, 11.1903*; Kempsey, NSW 45686, 9.1906; Bellangry, *Lane* NSW 45672, 9.1956; Wingham, *Maiden* & *Boorman* NSW 45680, 10.1902*; Kendall, *Bailey* NSW 45681, 9.1929; Big Brother Lookout, 20 miles [32 km] NE of Taree, *Coveny* NSW 104546, 9.1967; Middle Brother Lookout S. of Kendall, *Coveny* NSW 100014, 9.1967. CENTRAL COAST: ½ mile [0.4 km] SE. of Mt Kindarun, *Rodd* NSW 113507, 10.1965; Nepean, NSW 45689, 9.1897; Nepean R., Douglas Park, *Constable* 6168, 10.1965, *McBarron* 11046, 11.1965; Stanwell Park, *Canfield* NSW 45660, 10.1897; Mt Kembla, *Fletcher* NSW 45688, 12.1891; Jamberoo–Carrington Falls road, *Constable* NSW 30989, 1.1955; Jamberoo, *Canfield* NSW 45665, 12.1899; Kiama, *Alkin* NSW 45663, 1905; Badgerys Crossing to Nowra, *Forsyth* & *Hamilton* NSW 45685, 9.1899; Woodhill Bluff, *Rodway* 4, 9.1930; Barrengarry Mtn, *Maiden* NSW 45662, 9.1905; Cambewarra, *Bäuerlen* NSW 45667, 8.1884; near summit of Good Dog Mtn, Cambewarra, *Rodway* NSW 45666, 10.1918; Mt Cambewarra, Nowra, *Constable* NSW 16289, 12.1950. SOUTH COAST: c. 8 km W. of Ettrema Ck, Shoalhaven R. junction . . ., c. 37 km W. of Nowra, *Campbell* & *Pickard* 1349, 12.1970; Comerong I., *Rodway* NSW 45695, 9.1932; Mt Coolangatta (as "Coolangatta Hill"), *Rodway* NSW 45693, 10.1941; Illaroo road 10 miles [16 km] W. of Nowra, *Rodway* 2100, 12.1935; "Wogamia", Shoalhaven R., *Rodway* NSW 45694, 10.1925; Yadboro Ck near Pigeon House (Mtn), *Whaite* 3114, 10.1966; Majors Ck–Araluen, *Lee* 21, 11.1970; Lawlers Ck, Bodalla State Forest, *Constable* NSW 26202, 9.1953; 7 miles [11 km] N. of Narooma, *Salasoo* 5093, 5.1973; Mt Dromedary, *Rodway* NSW 45691, 12.1918; Bermagui, *Dunn* NSW 45682, 9.1916; Brown Mtn, E. of Nummitabel, *Pullen* 3939, 11.1963; Bega, per *Glenfield Vet. Res. Stn* NSW 45683, 11.1936; Wyndham, c. 24 miles [39 km] E. of Bombala, per *Glenfield Vet. Res. Stn* NSW 45636, 4.1939; Eden, *Cheel* NSW 45684, 12.1903; Letts Mtn, c. 36 km W. of Eden, *Crisp* 3465, 10.1977; Narrabarba, *Constable* NSW 30242, 10.1954; ½ mile [1 km] SW. of Tumbledown Mtn, Nadgee Nature Reserve, *Pickard* 1114, 6.1970. NORTHERN TABLELANDS: Mount Bajimba, *Constable* 7074, 8.1966; Walcha, *Boorman* NSW 45652, 12.1912. CENTRAL TABLELANDS: Cedar Ck, Cox R., *Whaite* NSW 45657, 12.1948; Jenolan Caves, *Blakely* NSW 45640, 10.1899; Murdering Gully, Kanangra, *Constable* 5888, 5.1965; Carkeneller Ck c. ¼ mile [1.2 km] from junction with Lannigans Ck, *Pickard* 527 & *Black*, 11.1969; ridge between Church Ck and Donnelly's Ck . . ., *Johnson* NSW 17264, 9.1951; Mt Colong, *Constable* NSW 6252, 3.1948; Colo Vale–Hilltop, *Cheel* NSW 45650, 10.1913; Gap Ck, c. 9 miles [15 km] by road NW. of Mittagong, *Lee* I, 11.1970; Armour Ra., NE. of Mt Armour, *Pickard* 402 & *Pickard*, 9.1969; top of Barrengarry Pass, *Rodway* 1574, 9.1934; Wingello State Forest, *Constable* 45655, 1.1956. SOUTHERN TABLELANDS: Box Point to Barbers Ck, *Maiden* NSW 45639, 10.1898; slopes of Mt Tidbinbillia . . . *Burbridge* 5593, 3.1957; Monga State Forest, *Constable* NSW 16296, 12.1950; Tallaganda State Forest, *Burbridge* 7666, 10.1967; Tallaganda, de Beuzeville NSW 45637, 11.1918; 1 mile [1.6 km] E. of Majors Ck, *Evans* 2658, 10.1967; Bendethera Caves fire trail, c. 3.2 km ENE. of Dampier Trig., *Coveny* 59704 & *Rodd*, 1.1975; WITHOUT PRECISE LOCALITY: northern New South Wales, *Paine* NSW 114029, 2.1970; *Fraser* NSW 45617, before 1833.

2. *Goodia medicaginea* F. Muell., Fragm. 1: 10 (1858); F. Mueller, Second Gen. Rep: 11 (1854) — *nomen*; Tate, Handb. Fl. Extratrop. South Australia: 66 (1890); Williamson, Victorian Naturalist 47: 110 (1930); Williamson in Ewart, Fl. Victoria: 658 (1931); Willis, Handb. Pl. Victoria 2: 283 (1973); Jacobs & Pickard, Pl. New South Wales: 122 (1981); Cunningham et al., Pl. W. New South Wales: 395 (1981). — TYPE: n.v.

* Stems, leaves and calyces with moderately dense pubescence comparable with that on "*G. pubescens*", but with stature and habit of *G. lotifolia*.

[*G. lotifolia* misappl., non Salisb.: Meissner in Lehmann, Pl. Preiss. 1: 88 (1844); Gardner, Enum. Pl. Austral. Occid.: 62 (1930); Black, Fl. South Australia edn 2, 2: 447 (1948); Blackall & Grieve, How to Know Western Austral. Wildfl. 1: 241 (1954); Beard (ed.), Descriptive Cat. W. Austral. Pl. edn 2: 68 (1970); Sands (1975); Polhill (1976). — All or part of the taxon treated as *G. lotifolia* in these references is *G. medicaginea*.]

A shrubby plant, very similar to *G. lotifolia* in all its parts, though often with denser foliage, attaining a height of 2 m but sometimes much smaller in stature — as little as 0.3 m high; stems glabrous or more or less pubescent with ascending to spreading, pale or white hairs as in *G. lotifolia*, the bark on mature stems (but not remote from flowering shoots) dark reddish to black, with close and rather coarse, irregular longitudinal ribbing or with minute excrescences sometimes arranged transversely around the stem. Leaflets usually glabrous above and sparsely appressed pubescent to hoary below, in shape not significantly different from those of *G. lotifolia* but often smaller; usually at least a few leaves with large leaflets as in that species remain on branches with a majority of noticeably smaller leaflets (this may be due to the frequent occurrence of new shoots with smaller leaflets on the flowering branches commonly preserved in herbaria, and perhaps to a more restricted period of seasonal growth in the drier areas inhabited), the stipules, bracts and bracteoles as for the genus. Inflorescence often but not always shorter than in *G. lotifolia*, commonly c. 5 cm long with the rachis condensed (bearing closer but as numerous flowers); subtended at the base of the peduncle by a trifoliolate leaf and with one or more buds also in the axil, the flowers mostly a little shorter, 8–9 mm long, than in *G. lotifolia*, each on a slender pedicel about as long as the calyx, and inserted on a small decurrent extension of the rachis; bracteole scars persisting on the upper half of the pedicel, sometimes close below the contracted receptacle. Calyx glabrous, or occasionally with some pubescence, often 4 mm long, the receptacle c. 1 mm; the upper lip almost truncate, the teeth joined for most of their length and with oblique or lateral points; teeth of the lower lip triangular (length:breadth = 2:1) or broader, the lowest (in fully mature flowers) slightly longer than the laterals and all usually shorter than the tube; margins of the teeth often flat, or inrolled only on the lowest tooth. Petals predominantly yellow, with orange or greenish toning, but with parts almost wholly red to purplish black. Ovary glabrous, or occasionally with some fine hairs mostly along the sutures in early fruiting stages. Pod predominantly light brown in colour, with transversely reticulating veins; 12–20 (–23) mm long, 7–12 mm broad, the shape varying as in *G. lotifolia* with stage of development. Seeds usually 1–3, the aril with a short foot or base encircling an elliptical hilum. Chromosome number: $2n=16$ (Sands, Proc. Linn. Soc. New South Wales 100 (2): 142 (1975); as *G. lotifolia* q.v.). Fl.: Aug.–Oct. Fr.: Sept.–Summer.

DISTRIBUTION: In the Central and South Western Slopes and South Western Plains of New South Wales, also in western Victoria and across southern South Australia and Western Australia, mostly in very dry interior or dry coastal habitats. Specimens in New South Wales are clearly distinct from *G. lotifolia*, but in western Victoria and southeastern South Australia some are uncertainly distinct (e.g. in the Grampians, Victoria, and on Kangaroo Is., South Australia).

CENTRAL WESTERN SLOPES: Weddin, Maiden NSW 45651, 12.1899; 41 km W. of West Wyalong . . ., Cunningham 4968 & Milthorpe, 8.1976; 37 km S. of West Wyalong, Cunningham & Milthorpe 2400, 7.1974; Temora, Dwyer NSW 45656, 10.1917, NSW 45638, 7.1934, Cheel NSW 45658, 7.1926, Southwood NSW 117336, 5.1963, Sutherland NSW 113925, 10.1970. SOUTH WESTERN SLOPES: Holbrook, Taylor NSW 45654, 9.1916. SOUTH WESTERN PLAINS: "Kenmure", Nymagee, Thompson NSW 117334, 3.1974; near Nymagee, Perry NSW 113721, 8.1969; near "Wyoming", Tottenham, Cunningham NSW 117335, 8.1971, 482, 8.1972; near "Marooba", Tottenham, Cunningham 41, 8.1971; Black Ra., N. of Tallebung, Cunningham 1462 & Milthorpe, 11.1973; Tallebung Mtns. . ., 50 miles [80 km] W. [WNW.] of Condobolin, Archer NSW 45687, 8.1908; 20 km E. of Rankins Springs, Mulham 1172, 9.1977.

22. PTYCHOSEMA Benth.[†]

In Lindl., Edwards's Bot. Reg. App. Swan River: xvi (1839)].

[From Gk. *ptyx*, a fold; *sema*, a sign (here the standard petal).]

Literature: Lee (1973); Polhill (1976); Thompson (1961); see page 178.

Small, soft-wooded undershrubs, with ascending or erect, rather scantily pubescent stems, and deeply sited perennial roots from which new vertical shoots arise, the plants retreating to underground parts after seasonal growth. Leaves imparipinnate with opposite leaflets, stipulate, without stipellae. Inflorescence of one to several flowers on slender, erect peduncles in (mostly) terminal, and leaf-opposed racemes; flowers bracteate and bracteolate, shortly pedicellate. Calyx not significantly 2-lipped, but with the two upper lobes slightly broader and joined higher than the lower three, or all nearly equal; receptacle nearly equal in length to the calyx tube, or shorter. Petals shortly clawed, predominantly orange-yellow with parts in purplish brown, the standard nearly semi-circular, ecallose, reflexed behind the other petals, the wings and keel obtuse. Stamens 10, all joined in a sheath open on the upper side, the anthers uniform, dorsifixed, with a slightly broadened brown connective. Ovary shortly stipitate, with several ovules, a short, glabrous style and small, terminal stigma. Pod flattened, on a slender stipe equal to the calyx. Seeds unmarked, the small rim-aril with (at least in the species in New South Wales) a minute tongue-like extension; radicle curved, short.

A genus of two species, endemic in Australia, each known from one or few locations only; one species in New South Wales.

Ptychosema anomalam F. Muell., Fragm. 9: 62 (1875); J.M. Black, Fl. South Australia edn 2, 2: 448 (1948); Lee, Contr. New South Wales Natl. Herb. 4(7): 416 (1973); Jacobs & Pickard, Pl. New South Wales: 126 (1981); Jessop (ed.), Fl. Central Australia: 152 (1981); Cunningham et al., Pl. W. New South Wales: 409 (1981). — HOLOTYPE: MEL 26461 !; ISOTYPE: MEL 26462 !; see Lee, l.c.

Small plants with several more or less pubescent stems, usually c. 20 cm in height, and a regenerative root system. Leaves c. 5 cm long, of 2–5 pairs of leaflets and a terminal one, all of similar size. Leaflets obovate, 2–6 mm long, 1–1.5 mm broad, entire, rather sparsely pubescent with long hairs on both sides, the tip minutely apiculate or blunt, often downturned. Stipules narrow-triangular, 1–3 mm long, acute, persistent. Inflorescence of about 5–9 flowers in terminal and leaf-opposed racemes, rarely compound, the flowers 10–14 mm long, subtended by a cymbiform green bract falling during flowering, and with a pair of similar but more persistent bracteoles inserted in the middle, or upper half, of the pedicel of 3 mm. Calyx of 5 apiculate teeth 2 mm long, equal to the tube, the upper pair sometimes more truncate with lateral points; all marked with a dark marginal line continuing through the sinus to the base; receptacle below the calyx tube elongate, almost as long as the tube. Petals predominantly yellowish in colour, the standard variable in colour, usually yellowish inside, darker (orange to purple) outside, the wings and keel shorter and usually with more purplish coloration, obtuse. Ovary glabrous, with up to 8 ovules. Pod 14–16 mm long, 5 mm broad, buff stippled with purple, the stipe c. 4–7 mm long. Seeds elliptical-oblong, greenish brown, c. 3 mm long, the rim-aril and its extension not pronounced. Fl.: Aug–Oct. Fr.: Nov.–Mar.

DISTRIBUTION: In New South Wales only in the North Western Plains; known from very few localities but sometimes abundant in those (e.g. Central Australia; vicinity of Ayers Rock); in ("red", "deep") sands of plains and dunes.

[†] by A.T. Lee

NORTH WESTERN PLAINS: "Burrawantie", 29° 10'S 145° 24'E, Mulham 1107, 8.1977; c. 70 km E. of Ennionia on Ellerslie to Boneda road, Henderson H 2572, 10.1977; "Nutty Springs", 29° 25'S 146° 07'E, Cunningham & Milthorpe 4165, 10.1975; 4 miles [6 km] NE. of Cumbarah on Lightning Ridge Road, Cunningham & Milthorpe 1962, 3.1974; E. of Narran Lake . . . McGillivray 2923, 11.1967.

23. MUELLERANTHUS Hutch.[†]

Gen. Fl. Pl. 1: 361 (1964).

[After F. Mueller, who had described the first species (but in *Ptychosema*), and Gk. *anthos*, a flower.]

Literature: Lee (1973); Polhill (1976); Thompson (1961); see page 178.

Small, soft-wooded, prostrate or ascending plants with several, variously pubescent stems up to 60 cm long. Leaves digitately trifoliolate, petiolate, stipulate, without stipellae. Inflorescence of solitary leaf-opposed flowers, or of 2-3 flowers in a raceme, the flowers bracteate and bracteolate on short pedicels, and longer, slender peduncles. Calyx 2-lipped, but not always distinctly so. Petals clawed, predominantly yellow with varying amounts of darker colour, of varying relative lengths and colouring, the wings and keel obtuse. Stamens 10, all joined in a sheath open on the upper side, the anthers uniform, dorsifixed, with a moderately broadened, brown connective. Ovary shortly stipitate, with up to 8 ovules, a glabrous upturned style and small terminal stigma. Pod flattened, tapered at the base or shortly stipitate, often with 8 seeds. Seeds mottled, finally exarillate, but (at least sometimes) with a temporary, fine, white, hooded aril, and a short, curved radicle.

A genus, endemic in Australia, of three species in eremian or dry areas of Queensland, New South Wales, South Australia and Western Australia; two species in New South Wales.

1. Plants glabrous or with a sparse pubescence; leaflets obocordate; stipules mostly 2-4 mm long and less than 1.5 mm broad; flowers 7-12 mm long with a purplish, dark keel..... *M. trifoliolatus* 1.
- 1.* Plants pilose with spreading hairs; leaflets obovate, or sometimes slightly obocordate; stipules mostly 3-6 mm long and 2-4 mm broad; flowers 5-7 mm long with a pale keel..... *M. stipularis* 2.

- 1. *Muelleranthus trifoliolatus* (*F. Muell.*) Hutch. ex A. Lee, Contr. New South Wales Natl. Herb. 4 (7): 418 (1973); [Hutchinson, Gen. Fl. Pl. 1: 361 (1964), comb. invalid]. — *Ptychosema trifoliolatum* F. Muell. (basionym), Wing's Southern Scienee Reeord 2: 72 (1882); Tate, Handb. Fl. Extratrop. South Australia: 59, 66 (1890); Moore & Betche, Handb. Fl. New South Wales: 148 (1893); Tate in Part III (Sect. II, Botany): 153 (1896) in Spneeer (ed.), Rep. Work Horn Sci. Exped. Centr. Australia; Maiden & Betche, Census New South Wales Pl.: 107 (1916) (as *P. trifoliolastrum*); Ewart & Davies, Fl. Northern Territory: 145 (1917) (as *P. trifoliatum*); Gardner, Enum. Pl. Austral. Occid.: 64 (1930); Black, Trans. Roy. Soc. South Australia 62: 103 (1938); Black, Fl. South Australia edn 2, 2: 448 (1948); Blackall & Grieve, How to Know Western Austral. Wildfl. 1: 241 (1953); Lee, Contr. New South Wales Natl. Herb. 4 (7): 417 (1973); Jacobs & Pickard, Pl. New South Wales: 125 (1981); Jessop (ed.), Fl. Central Australia: 152 (1981); Cunningham et al., Pl. W. New South Wales: 407 (1981). — HOLOTYPE: MEL 26470 !; ISOTYPE: MEL 26471 !, see Lee, i.e.**

[†] by A.T. Lee

Soft-wooded prostrate plants with long (to c. 50 cm), fine, sometimes reddish stems radiating from a central root, glabrous or scantily pubescent on the stems and peduncles, more densely on the pedicels and rarely on the leaves, petioles, stipules and calyx teeth, with appressed to spreading hairs. *Leaves* with the leaflets entire, usually emarginate at the apex and obovate, rarely truncate or shortly acute and obovate, mostly glabrous, (1.5-) 2-3 (-8) mm long, 1-3 (-7) mm broad, the lateral veins obscure. *Stipules* narrow- to broad-ovate, acuminate or acute (1-) 2-3 (-4.5) mm long. *Inflorescence* terminal and leaf-opposed, of 1 (-3) racemose flowers on a slender peduncle (1-) 1.5-5.0 (-11) cm long, the flowers c. 7-12 mm long, on a short (3.5 mm) pedicel with a narrow-ovate, readily deciduous bract at its base, and a pair of similar but more persistent bracteoles near or above the middle. *Calyx* of five equal teeth nearly equal to the tube, the two upper ones joined higher than the others; the small receptacle evident in the (dried) fruiting calyx. *Petals* of unequal length, the standard longer or shorter than the keel, yellow or orange, banded around the "eye", sometimes to the edge, and outside, with purplish flushes, the wings, usually the shortest petals, orange-yellow with some dark purplish flushes, and the keel with a very obtuse, almost circular, distal half, crimson or darker, 7-10 (-12) mm long, 3-4.5 mm broad distally. *Ovary* glabrous, shortly stipitate with up to 10 ovules. *Pod* flattened, (13-) 17-25 (-29) mm long, 4-5 (-6) mm broad, narrow-oblong, buff, usually with some fine reddish stippling and some transverse reticulation, the stipe equal to the calyx; maturing seeds from all or most of the ovules. *Seeds* spherical, mottled brick red and pale, (? rarely) with a small, fragile, presumably evanescent, hooded aril, finally exarillate. Fl.: erratic (Apr., July). Fr.:? (held all growing season).

DISTRIBUTION: In eremeal and other dry areas of northwestern New South Wales, and of Queensland, South Australia, Western Australia and the Northern Territory; on red and other sands but often in association with creeks, swamps or waterholes, or in shaded situations.

NORTH WESTERN PLAINS: . . W. of "Tundulya" . . S. of Louth, 30° 55' S, 145° 00' E, Pickard 2012, 3.1973; "Pulpulla", near Cobar, Andra, 1885 (MEL 26467).

2. Muelleranthus stipularis (J.M. Black) A. Lee, Contr. New South Wales Natl. Herb. 4 (7): 419 (1973); Jacobs & Pickard, Pl. New South Wales: 125 (1981); Jessop (ed.), Fl. Central Australia: 152 (1981); Cunningham et al., Pl. W. New South Wales: 407 (1981). — *Ptychosema stipulare* J.M. Black (basionym), Trans. Roy. Soc. South Australia 62 (1): 103 (1938). — HOLOTYPE: Bundoora, Cleland 8.1936 ! (AD 95830040); ISOTYPE: MEL 26465 !; see Lee, l.c.

Similar to the preceding species in habit and habitat, but differing in pubescence, leaf shape, stipule size and colour of the keel; the stems to 60 cm in length, radiating from a central root, prostrate, clothed like most of the vegetative parts with a more or less dense pubescence of softly spreading hairs nearly 1 mm long. *Leaves* with leaflets broad-ovate with a broad-acute apex (rarely slightly emarginate), (2-) 3-5 (-9) mm long, (1.5-) 2-3.5 (-5) mm broad, pubescent on both surfaces or glabrescent above. *Stipules* mostly 3-6 mm long and 2-4 mm broad. *Inflorescence* terminal and leaf-opposed, of solitary flowers on a slender, spreading-pubescent peduncle (0.7-) 1.5-2.0 (-4) cm long, the flowers mostly 5-7 mm long, on a short pedicel (1-2 mm), with bracts and bracteoles as in *M. trifoliolatus*. *Petals* usually appearing dark, the standard dark red to black, 4-6 mm long, the wings also dark, and shorter than the pale, greenish (sometimes dark at the tip) keel, 4-6 mm long, with a broad, almost circular, distal half. *Ovary* glabrous, shortly stipitate, mostly with 8 ovules. *Pod* flattened, 2-3 cm long, 4-6 mm broad, narrow-oblong, buff but often with some reddish coloration, and some transverse reticulation, the stipe equal to, or a little longer than the calyx; maturing seeds from all or most ovules. *Seeds* spherical, exarillate, mottled with pale, light reddish and black areas. Fl.: erratic (Apr.-Sept.). Fr.:? (held all growing season).

DISTRIBUTION: In crevices and other dry areas of northwestern New South Wales and of Queensland, South Australia, Western Australia and Northern Territory, on sandy soils, often deep red sand, and around spinifex (*Triodia* spp.) clumps; more or less frequent according to local climatic state.

NORTH WESTERN SLOPES: Rocky Glen [NE. of Coonabarabran], *Green NSW 117337*, 5.1974. NORTH WESTERN PLAINS: "Ellerslie", Ennongia, *Whalley NSW 114250*, ?4.1957; $\frac{1}{2}$ mile [0.8 km] NNW. of Cumbarah, *Lee NSW 114251*, 3.1968; "Kurrajong" Station near Glengarry Opal Field, c. 100 km NE. of Brewarrina, *Thompson 2110*, 9.1974; "Muttabun". Walgett, *de Saram NSW 113605*, 11.1969, *NSW 113618*, 12.1969.

24. TEMPLETONIA R. Br.[†]

In W.T. Aiton, *Hortus Kew.* edn 2, 4: 269 (1812).

[After John Templeton, Irish botanist, 1766–1825.]

Literature: Lee (1970, 1973); Polhill (1976); Sands (1975); Thompson (1961); Ross (1982); sec page 178.

Shrubs with terete or flattened, angled or striate, occasionally spinescent stems from a woody stock, the branches angled or striate, occasionally spinescent. Leaves alternate, simple, unifoliolate or reduced to scales, or rarely digitately to pinnately 3–5-foliolate, sometimes subtending a mass of glandular processes in the axils, the leaflets (when present) terete, or narrow and flat, entire or emarginate; stipules absent or minute or larger and spinous; stipellae present in unifoliolate and compound leaves, minute. Flowers solitary or several from the axils, sometimes in apparent racemes or leafless branches, the bract subtending each flower usually distinct though small, sometimes associated below with small scales or a cluster of dark red hairs (? modified bracts of suppressed flowers), the bracteoles paired, at or above the middle of the pedicel, and sometimes rather conspicuous. Calyx with the two upper lobes united, often completely, or rarely distinct, broader than the other 3 lobes, the lateral lobes shortest, the lowest sometimes longest. Petals in shades of yellow to red and purplish brown, often bi- or tri-coloured, the standard orbicular or sometimes broader or narrower, clawed, usually reflexed and longer than the narrow wings, the keel as long as the standard or shorter, its petals often incompletely united. Stamens 10, all united in a sheath open on the upper side, the anthers alternately long and basifix and shorter and dorsifix. Ovary with few to several ovules, an incurved slender style and small terminal stigma. Pod narrow-oblong, sometimes obliquely, sessile or stipitate, flattened or somewhat turgid, the valves coriaceous but the edges scarcely thickened. Seeds somewhat compressed with a conspicuous aril surrounding a small hilum, the aril collar-like, usually with a small outgrowth on one side or an extension at one end, the margin often undulate; radicle short, straight.

A genus of approximately 11 species, endemic in Australia; 4 species in New South Wales.

1. Shrubs with some leaves.
2. Stipules inconspicuous, triangular, about 1 mm long *T. stenophylla* 1.
- 2.* Stipules conspicuous, recurved and pungent, 2–10 mm long *T. aculeata* 2.
- 1.* Leafless shrubs.
3. Stems flattened, or rarely almost terete, the tips rigid and sharply pointed.
Calyx lobes 4. *T. sulcata* 3.
- 3.* Stems terete, the tips blunt and somewhat lax. Calyx lobes 5 *T. egena* 4.

[†] by J. Thompson; some additional information, including a description of the pod of *T. aculeata*, from Dr J.H. Ross (pers. comm.) is acknowledged with thanks.

1. Templetonia stenophylla (*F. Muell.*) *J.M. Black*, Fl. South Australia 2: 304 (1924) and edn 2, 2: 446 (1948); *Domin*, Biblioth. Bot. 22 (89): 728 (1925); Williamson in Ewart, Fl. Victoria: 663 (1931); *Willis*, Handb. Pl. Victoria 2: 281 (1973); Beadle, Stud. Fl. N.E. New South Wales 3: 394 (1976); Jacobs & Pickard, Pl. New South Wales: 129 (1981). — *Bossiae stenophylla* *F. Muell.* (basionym), *Pl. New South Wales*: 129 (1858), l.c. 2: 178 (1961). — *Templetonia muelleri* *Benth.*, Fl. Austral. Fragm. 1: 9 (1858), l.c. 2: 178 (1861). — *Templetonia muelleri* *Benth.*, Fl. Austral. 2: 169 (1864); *F. Mueller*, Key System Victorian Pl. 1: 215 (1888), 2: 19 (1886); *Tate*, Handb. Fl. Extratrop. South Australia: 65 (1890); *Moore & Betche*, Handb. Fl. New South Wales: 143 (1893); *F.M. Bailey*, Queensland Fl. 2: 367 (1900); *Maiden & Betche*, Census New South Wales Pl.: 105 (1916). — HOLOTYPE: MEL 20338!; see Lee (1970, as "MEL 20448"); Ross (1982).

A small shrub with a thick rootstock and glabrous ridged stems up to c. 0.5 m long. Leaves simple, subsessile, (<1-) 2–5 (–7) cm long, often deciduous, the majority narrow-elliptical and narrowest towards the upper part of the stems, glabrous, thick in texture, the margins incurved, the apex usually with a small, somewhat recurved, often pungent point, the venation obscure above, more prominent below; stipules inconspicuous, triangular, c. 1 mm long. Flowers solitary or in pairs in the axils, 1–1.2 cm long, on pedicels usually 4–7 mm long. Bracts sometimes obscure among dark red glandular hairs in the axils, broad, c. 1 mm long, sometimes with a few associated scales. Bracteoles c. 2 mm long, broad-ovate, obtuse, glabrous except for ciliate margins; attached near the middle of the pedicel. Calyx 3–4 mm long, the outer surface glabrous, the lobes much shorter than the tube, broad, obtuse or acute, ciliate, the 2 upper lobes united to form one minutely notched lobe, the lowest somewhat longer than the others. Petals reddish brown and yellow, the standard a little longer than the keel, the wings usually a little shorter. Ovary stipitate, glabrous, the style flattened, the ovules c. 8. Pod on a stipe of 4–5 mm, glabrous, somewhat turgid, obliquely oblong, 1.5–2 cm long, with about 6–8 conspicuously arillate seeds. Fl.: Spring.

DISTRIBUTION: On the inland slopes of the Great Dividing Range in New South Wales and Victoria, and also in Queensland and South Australia.

NORTH WESTERN SLOPES: Warialda, *Brown* NSW 143383, 8.1933, *Hayward* NSW 46160, 9.1956; Inverell Road and Frasers Creek, *Boorman* NSW 44619, 9.1910; New England, NSW 44614; Woa Gorge, Mt Kaputar National Park, ..., *Coveny* 9033 & *Roy*, 11.1976; Narrabri West, *Boorman* NSW 44617, 8.1907; Horton R., *Rupp* NSW 44611, 10.1912; Warrumbungle National Park, *Hershey* NSW 46147, 10.1958; Tamworth, *Rupp* NSW 44613, 11.1904. CENTRAL WESTERN SLOPES: Ellerston on the upper Hunter R., *Mitchell* NSW 101140, 9.1956; Dubbo, *Betche* NSW 44603, 9.1883, *Boorman* NSW 44608, 11.1905; Wongarbon Nature Reserve, c. 20 km SE. of Dubbo, *Coveny* 10412 & *Benson*, 8.1979; 6 km SE. of Muswellbrook, *Turner* NSW 143382, 9.1976; Holydene, 24 miles [39 km] SW. of Muswellbrook, *Hoskin* NSW 44604, 8.1955; Burrendong Arboretum near Wellington, *Althofer* NSW 95544, 1966; Glen Ora Crk, Dripstone, *Althofer* NSW 44609, 12.1944; Fifield, *Cambridge* 1952, 1908; Amaroo, *Sparks* NSW 44610, 1.1941; Bowan Park near Cudal, *Blakely* NSW 44615, 10.1906; Wyalong, *Boorman* NSW 44616, 9.1906. SOUTH WESTERN SLOPES: Alma Park, *McBarron* 5374, 10.1950; Burrumbuttock, *McBarron* 3615, 9.1949.

2. Templetonia aculeata (*F. Muell.*) *Benth.*, Fl. Austral. 2: 170 (1864); *Tate*, Handb. Fl. Extratrop. South Australia: 65 (1890); *Moore & Betche*, Handb. Fl. New South Wales: 143 (1893); *Dicks & Pritzel*, Bot. Jahrb. Syst. 35: 265 (1904); *Maiden & Betche*, Census New South Wales Pl.: 105 (1916); *Gardner*, Enum. Pl. Austral. Occid.: 62 (1930); *Beard* (ed.), Descriptive Cat. W. Austral. Pl. edn 2: 73 (1970); *Jacobs & Pickard*, Pl. New South Wales: 129 (1981); *Ross* in *Jessop* (ed.), Fl. Central Australia: 150 (1981); *Cunningham* et al., Pl. W. New South Wales: 423 (1981). — *Bossiae aculeata* *F. Muell.* (basionym), *Fragm.* 2: 120 (1861). — HOLOTYPE: MEL 20339!; see Lee (1970); Ross (1982).

A low shrub about 45 cm high with rigid, almost terete, flexuose, glabrous or pubescent, ridged stems. Leaves thick in texture, few, apparently simple, the

blade sessile on a short pulvinus, 1–1.5 cm long; usually narrow-ovate, narrowest towards the upper part of the stems, glabrous, with rather conspicuous venation below, the margins incurved, the apex with a straight pungent point; stipules 2–5 mm long, rigid, recurved, pungent. Flowers solitary or in pairs in the axils, 1–1.2 cm long, on pedicels up to 5 mm long, the pedicels surrounded at their bases by dark reddish hairs. Bracts broad, c. 1 mm long. Bracteoles 1.5–2 mm long, almost circular with a small distal point, glabrous or sparsely short-ciliate, attached near or above the middle of the pedicel. Calyx 4–6 mm long, the outer surface glabrous or with a rather sparse pubescence mostly on the tube, the lobes about equal to the tube, broad, acute, ciliate, the two uppermost largely united, the lowest longer than the others. Petals reddish brown and yellow, the standard about equal to the keel, reflexed, the wings shorter. Ovary shortly stipitate, glabrous, with about 6 ovules, the style flattened. Pod coriaceous, glabrous, flattened, obliquely oblong or oblong-elliptic, 1.5–2 cm long, 0.6–0.75 cm broad, on a stipe finally the calyx; seed-aril with a lateral lip. Chromosome number: $2n = 16$ (Sands, Proc. Linn. Soc. New South Wales 100 (2): 142 (1975)). Fl.: Aug.–Oct.

DISTRIBUTION: Dry parts of southern Australia, from western New South Wales and South Australia (Flinders Ranges) to southern Western Australia.

NORTH WESTERN PLAINS: "Tundulya", c. 25 miles [c.40 km] SE. of Louth, Moore 5721, 3.1971; Cobar, Curran NSW 44600; 37 km SW. of Nyngan on Bobadah Road, Cunningham 2745 & Mithorpe, 8.1974; "Mt Lewis", Coabelego, Soil Conservation Service, Nyngan NSW 143386, 4.1971. SOUTH WESTERN PLAINS: near "Yarrama", Nymagee, Cunningham 8, 8.1971; between the Lachlan and Darling Rrs, Day NSW 44602, 1878; Yathong Nature Reserve 45 km N. of Roto, Brickhill 603–12, 9.1977; on Hillston-Cobar road N. of One Eye Tank, Whaite 2746, 9.1963; 10 miles [16 km] E. of Matakana, Cunningham 240, 9.1971; 2 miles [3 km] E. of Matakana, Cunningham 433 & Mithorpe [as P.L.M.], 9.1972; County Dowling (Lake Cargelligo area), Beadle NSW 44601, 5.1940; 14 km E. of Lake Cargelligo, Cunningham 1043 & Mithorpe, 8.1973; 21 miles [34 km] from Lake Cargelligo on Stock Route 190, Whaite 2196, 9.1962; along the Goolgowi-Rankin Springs-Weethalle Road, Mitchell NSW 97411, 9.1961; Barellan, Chisholm NSW 44599, 9.1936.

3. *Templetonia sulcata* (Meisn.) Benth., Fl. Austral. 2: 171 (1864); F. Mueller, Key System Victorian Pl. 1: 215 (1888), 2: 19 (1886); Tate, Handb. Fl. Extratrop. South Australia: 65 (1890); Moore & Betche, Handb. Fl. New South Wales: 144 (1893); Diels & Pritzel, Bot. Jahrb. Syst. 35: 265 (1904); Maiden & Betche, Census New South Wales Pl.: 105 (1916); Black, Fl. South Australia 2: 305 (1924) and edn 2, 2: 446 (1948); Gardner, Enum. Pl. Austral. Occid.: 62 (1930); Ewart, Fl. Victoria: 664 (1931); Blackall & Grieve, How to Know Western Austral. Wildfl. 1: 240 (1954); Beard (ed.), Descriptive Cat. W. Austral. Pl. edn 2: 73 (1970); Willis, Handb. Pl. Victoria 2: 281 (1973); Jacobs & Pickard, Pl. New South Wales: 129 (1981); Cunningham et al., Pl. W. New South Wales: 423 (1981). — *Bossiaeae sulcata* Meisn. (basionym) in Lehmann, Pl. Preiss. 1: 81 (1844). — TYPES (?ISOTYPES): MEL 20340 !, 20341 !, see Lee (1970, as HOLOTYPE); Ross (1982).

Bossiaeae rossii F. Muell., Fragm. 3: 94 (1862). — LECTOTYPE: MEL 20342 !; see Lee (1970, as HOLOTYPE); Ross (1982).

A rigid shrub to about 1 m high (to 3 m in Western Australia), with divaricate, flattened, ridged, glabrous branches 3–5 mm broad, often ending in spines and notched at the nodes. Leaves reduced to small scales (seen rarely and only on young shoots) between minute deltoid stipules, all soon deciduous. Flowers solitary or in pairs, in the axils, 5–7 mm long, on very short pedicels. Bracts broad, minute, deciduous. Bracteoles c. 1.5 mm long, brown, scarious, broad-elliptical, glabrous except for the ciliate margins, inserted on the upper part of the pedicel and enclosing the base of the calyx. Calyx c. 3 mm long, the outer surface shining, glabrous, the lobes shorter than the tube, ciliate, the two uppermost usually completely united, all almost equal in length. Petals brownish red and yellow, the standard somewhat longer than the wings and keel. Ovary almost sessile, glabrous,

with about 2–4 ovules; the style flattened. Pod very firm, dark purplish brown to black, almost sessile, glabrous, somewhat flattened, obliquely obovate or elliptical, usually 1–2 cm long, with 1 or occasionally 2, large flat seeds. Chromosome number: $2n = 16$ (Sands, Proc. Linn. Soc. New South Wales 100 (2): 142 (1975)). Fl.: Aug.–Sept. (–Dec.).

DISTRIBUTION: Drier parts of southern Australia, from the Western Plains of New South Wales, and northwestern Victoria, to southwestern Western Australia.

SOUTH WESTERN PLAINS: Griffith–Rankin Springs area, Martin NSW 44628, 11.1955; Murray R., Henry NSW 44626. SOUTHERN FAR WESTERN PLAINS: 12 miles [19 km] W. of Euston, Mulham NSW 114016, 9.1970; 20 km W. of Balranald, Mulham 1222, 8.1977.

4. Templetonia egena (F. Muell.) Benth., Fl. Austral. 2: 170 (1864); F. Mueller, Key System Victorian Pl. 1: 215 (1888), 2: 19 (1886); Tate, Handb. Fl. Extratrop. South Australia: 65 (1890); Moore & Betche, Handb. Fl. New South Wales: 144 (1893); F. M. Bailey, Fl. Queensland 2: 367 (1900); Diels & Pritzel, Bot. Jahrb. Syst. 35: 265 (1904); Maiden & Betche, Census New South Wales Pl.: 105 (1916); Ewart & Davies, Fl. Northern Territory: 139 (1917); Black, Fl. South Australia 2: 304 (1924) and edn 2, 2: 446 (1948); Gardner, Enum. Pl. Austral. Occid.: 62 (1930); Ewart, Fl. Victoria: 663 (1931); Blackall & Grieve, How to Know W. Austral. Wildfl. 1: 240 (1954); Beard (ed.), Descriptive Cat. W. Austral. Pl. cdn 2: 73 (1970); Chippendale, Proc. Linn. Soc. New South Wales 96: 242 (1972); Willis, Handb. Pl. Victoria 2: 281 (1973); Leigh & Mulham, Telopea 1 (4): 262 (1977); Jacobs & Pickard, Pl. New South Wales: 129 (1981); Ross in Jessop (ed.), Fl. Central Australia: 151 (1981); Cunningham et al., Pl. W. New South Wales: 423 (1981). — *Daviesia egena* F. Muell. (basionym), Trans. & Proc. Vict. Inst. Adv. Sci. for 1854–5: 118 (1855). — *Bossiaeae egena* (F. Muell.) F. Muell., Hooker's J. Bot. Kew Gard. Misc. 8: 43 (1856); F. Mueller, Fragm. 3: 94 (1862). — LECTOTYPE: MEL 20345 !; see Lee (1970); Ross (1982).

A leafless shrub 1–3 m or more in height with glabrous, terete, ridged stems. Leaves reduced to short broad scales; stipules absent. Flowers usually two together in the axils, 5–7 mm long, on very short pedicels, appearing racemosc on the leafless branches. Bracts broad, minute, deciduous. Bracteoles c. 2 mm long, very broad-ovate with a notched, obtuse apex, glabrous except for ciliate margins; attached on the upper part of the pedicel and enclosing the base of the calyx. Calyx c. 3 mm long, the outer surface glabrous, the lobes much shorter than the tube, broad, obtuse, ciliate, the 4 upper lobes almost equal in size, the lowest longer. Petals brownish red and yellow, the standard somewhat longer than the wings and keel. Ovary almost sessile, glabrous, with a somewhat flattened style and c. 8 ovules. Pod (commonly only one developing from each pair of flowers) very dark, hard, glistening, almost sessile, glabrous, somewhat flattened, obliquely obovate or narrow-ovate, usually 1.5–2 cm long with one or occasionally two large flat seeds. Fl. Aug.–Sept. (–Feb.).

DISTRIBUTION: Dry parts of Australia, from inland New South Wales and Queensland, and northwestern Victoria, to the northern and eremeal districts of Western Australia.

CENTRAL WESTERN SLOPES: Peak Hill, Boorman NSW 44548, 10.1906; Harvey Ras, Peak Hill, Boorman NSW 44549, 11.1905; Harvey Ras, Maiden NSW 44542, 9.1898; Condobolin, NSW 44541, 8.1897; Derriwong, E. of Condobolin, SCS2391, 9.1971; Bogan Gate to Condobolin, Maiden NSW 44544, 8.1897; Wyalong, Forester NSW 44547, 10.1905. NORTHERN WESTERN PLAINS: Cobar, Arthur NSW 44545, 12.1927; Mt Boppy, Boorana NSW 44559, 11.1903; Nyngan, Rogers NSW 44552, 9.1905; Hermidale, 15 miles [24 km] W. of Nyngan, Constable 4660, 10.1963; "Urunda", Hermidale, Thompson 1870, 9.1977. SOUTH WESTERN PLAINS: Bedooba, Bäuerlen NSW 44546, 1.1904; Wooyeo, Lake Cargelligo [as Cargellieo], Maiden NSW 44554, 1.1890; Merriwagga, Gammage NSW 44550, 8.1936; towards Coeaparra Ra., Griffith district, Withers NSW 44553, 8.1950; 17 miles [27 km] N. of Barellan, Edwards NSW 113505, 9.1969; "Mungo", Balranald, Alchin 559, 8.1976; Moulamein, Mulham NSW 114018, 10.1970. NORTHERN FAR WESTERN PLAINS: Langawirra, Milthorpe 787, 8.1972; Mundi Mundi

Station, Silverton, *Constable NSW 5212*, 11.1947; Broken Hill, *Andrews NSW 44558*, 12.1917, *NSW 44557*, 9.1918, *NSW 44556*, 12.1918; Broken Hill, *Morris NSW 44555*, 11.1919. SOUTH FAR WESTERN PLAINS: South Ita [as Ida] Station, 40 miles [64 km] S. of Broken Hill, *Constable NSW 44543*, 7.1955; Kimberley Station, 50 miles [80 km] SE. of Cockburn, *Constable NSW 36712*, 7.1955; 40 miles [64 km] W. of Ivanhoe, *Mulham NSW 85312*, 8.1967; Manfred Ra., *Henshall NSW 143396*, 11.1972; 3 miles [5 km] W. of Cal Lal, *Constable & Johnson NSW 47193*, 3.1959. WITHOUT PRECISE LOCALITY: Between the Lachlan and Darling R[s]. *Bruckner NSW 117313*, 10.1885.

25. HOVEA R. Br.[†]

In W. T. Aiton, Hortus Kew. edn 2, 4: 275 (1812).

[After A. P. Hove, a Polish naturalist.]

Literature: Polhill (1976); Sands (1975); Thompson (1961); see page 178.

Concepts of species in *Hovea* have been confused for many years, and the genus is at present under revision. In order to include the genus in its place in this part of the Flora of New South Wales, we have therefore undertaken a survey which is necessarily of limited extent. It has not been possible in the time available to deal with some problems of uncertain taxonomic status, or of typification; the study is based on material at NSW only, names for new taxa are not published, and specimen citation is omitted except for EXAMPLES where necessary to establish our application of names. Nevertheless, the survey has resulted in the recognition of taxa which can be identified with some confidence from the key provided.

Shrubs or undershrubs, often many-stemmed from a woody rootstock, a few species with weak or slender stems, the stems and branches terete or slightly angular-ridged, sometimes modified as thorns and spine-tipped, usually and variously pubescent, rarely glabrous. Leaves simple, pulvinate, alternate or rarely appearing clustered (when crowded at the base of modified, spinescent, axillary branches), acute to obtuse or somewhat retuse, entire, toothed or irregularly crenulate, usually glabrous above except sometimes on or near the midrib, and variously pubescent below, the lamina flat or slightly folded up to V-shaped in section or arched either side of the midrib, with flat or more or less recurved to closely revolute margins; often mucronate, the mucro and short pulvinus usually with the pubescence of the stems, occasionally pungent; the venation often conspicuously reticulate and showing veins of different orders, sometimes scabrid from projections at vein junctions, occasionally with the primary lateral veins parallel and more conspicuous than the reticulation; stipules usually present, but sometimes capriciously and then subulate or setaceous. *Indumentum* (sometimes varying on different parts of the plant) often of mixed hair types, with medi-fixed or asymmetrically biramate hairs in some species, and tightly curled and/or crinkled and/or long, straight hairs, in proportions of some constancy, in others. *Inflorescence* a sessile or pedunculate axillary raceme, sometimes auxotelic (i.e. growing on to form a leafy shoot), or more commonly a condensed, few-flowered cluster; a cluster sometimes in each of the upper axils in a series thus simulating, by loss of subtending leaves, a compound inflorescence; *flowers* sessile or pedicellate, bracteate and bracteolate, the bracts inserted at the base of, but often adnate to and carried high on, the pedicel, the bracteoles in a regularly opposite pair inserted at the base of the receptacle but occasionally adnate to it for all or part of its depth. *Calyx* distinctly 2-lipped, the upper lip usually broad, more or less truncate, retuse, of two partially joined lobes, often divergent or with lateral points, the lower lip of three narrower, more or less triangular lobes; occasionally the teeth

[†] by J. Thompson and A. T. Lee.

of the upper lip more deeply separated, symmetrical and resembling the lower teeth. Petals blue to purple, occasionally white, all with relatively long, slender claws, the standard broader than long and usually longer than the other petals, the wings usually dilated and sometimes notched distally and the keel, the shortest petal, more or less obtuse, sometimes narrowly so. *Siamens* 10, joined in a sheath open on the upper side, with some irregularities (e.g. the vexillary filament free in *H. chorizemifolia*, and the carinal filament also largely separate in this and other species); anthers dimorphic, 5 long and basifixated alternating with 5 short and dorsifixated. Ovary with 2–several ovules, the style slender, often densely pubescent at the base or in the lower half, upcurved in the keel to a small, capitate, terminal stigma. Pod sessile, subsessile or distinctly stipitate, short, obliquely globular or ellipsoid, turgid and reaching full size long before the seed matures, 2-seeded in most species but in some 1- or several-seeded. Seeds usually nearly black, plump and c. 5 mm long, with the linear or elliptical hilum on the long side, surrounded by a usually conspicuous collar-like aril with a raised lobe near the micropylar end, long (c. $\frac{1}{4}$ length of seed or more) or short (c. $\frac{1}{3}$ length of seed or less); in one species, *H. longipes*, quite different, being much larger, flattened and reddish brown, with an inconspicuous aril and small circular hilum.

A genus of about 20 species, widespread and endemic in Australia; 11 species in New South Wales.

1. Pod distinctly stipitate, the stipe at least as long as the calyx. Leaves with the primary lateral veins at an acute angle, c. 45° , to the midrib. Flowers distinctly pedicellate in sessile clusters in the leaf-axils. Hairs of the pubescence medifixated. Seeds brown, flattened, to 9 mm long with an insignificant aril and circular hilum..... *H. longipes* 1.
- 1.* Pod sessile or subsessile. Leaves with the primary lateral veins, if distinct, almost at right angles to the midrib, or if at an acute angle (as sometimes in *H. acutifolia*) then the angle c. 50° or more. Flowers and inflorescence various. Hairs of the pubescence of different forms but not medifixated or biramate. Seeds almost black, plump, usually c. 5 mm long, with a conspicuous long or short aril, and a linear hilum.
2. Leaves (? always) dimorphic, ovate or elliptical near the base of stems, linear above. Usually few-stemmed undershrubs with prostrate or decumbent habit, at least when young; sometimes erect but rarely more than 1 m in height. Pubescence of stems, and usually of all parts of \pm long, antrorse hairs..... *H. linearis* 2.
- 2.* Leaves not dimorphic. Densely branched, many-stemmed, woody shrubs usually over 1 m in height (the stems decumbent and stature lower in some forms of high altitude areas). Stem pubescence various.
 3. Stem pubescence of curled, crinkled, or long, straight hairs, often in mixtures, but not exclusively of tightly curled hairs. Leaves arched either side of the midrib and recurved, sometimes strongly; rarely almost flat.
 4. Floral bract more or less close under the bracteoles, the interval 2 mm or less, or if atypically greater, the pubescence rust-coloured.
 5. Floral bract immediately below the bracteoles, the interval less than 1 mm, or if occasionally more then the leaves strongly reticulate and usually closely revolute.
 6. Bracteoles much shorter than the calyx, shorter than the calyx tube, and pubescent over most of the outer surface..... *H. rosmarinifolia* 3.
 - 6.* Bracteoles almost as long as the calyx, usually with much of the outer surface glabrous..... *H. "sp. P"* 4.
 - 5.* Floral bract not immediately below the bracteoles, the interval 1–2 mm, or if occasionally less then the plants with a long, spreading pubescence.
 7. Bract and bracteoles narrow-acute to acuminate at the apex. Flowers sessile or pedicellate.
 8. Inflorescence sessile, or if subsessile then the peduncle obscure or slender and less than 3 mm long. Flowers sessile to pedicellate.

9. Leaves arched up a little from the midrib and recurved, usually strongly, so as to appear almost linear. Flowers subsessile in subsessile clusters, the very short pedicels and peduncle obscured by the long, spreading pubescence..... *H. purpurea* 5.
- 9.* Leaves flat and usually broad and elliptical. Flowers subsessile as in *H. purpurea* or with the peduncle and/or pedicels longer, or at least appearing so from the less obscuring effect of the more appressed pubescence *H. acutifolia* 6.
- 8.* Inflorescence a pedunculate cluster, the peduncle (3-) 10–20 mm long, subtended by a leaf and bearing the floral bracts of subsessile flowers clustered at the top *H. "sp. O"* 7.
- 7.* Bract and bracteoles obtuse, or if somewhat acute then shortly and broadly so. Flowers pedicellate *H. "sp. Q"* 8.
- 4.* Floral bract usually c. 4 mm below the bracteoles, at or near the base of a distinct pedicel often of near-black aspect from its pubescence *H. longifolia* 9.
- 3.* Stem pubescence exclusively, or very nearly so, of tightly curled hairs, giving a felted appearance, and often pale grey in colour. Leaves almost flat, or with each side flat and the whole V-shaped in section; rarely somewhat recurved.
10. Floral bract close under the bracteoles *H. lanceolata* 10.
- 10.* Floral bract removed from the bracteoles, the interval 3 mm or more *H. "sp. R"* 11.

1. *Hovea longipes* Benth., in Hueg., Enum.: 37 (1837). — TYPE: n.v.; in Bauer's collection (? W).

H. leiocarpa Benth., in Mitch., Trop. Australia: 289 (1848). — TYPE: n.v.

A many-stemmed, somewhat woody shrub, 1–3 m in height, characterised by: *stem pubescence* appressed, of medifixed hairs; *leaves* obovate, ovate, obovate-elliptical or elliptical, often 2–3 cm long, densely appressed-pubescent or hoary below with venation as in the key.

DISTRIBUTION: In the Northern Tablelands, and the North and Central Western Slopes; also in Queensland, where it appears to be widespread; usually in stony or rocky places on a variety of soils.

A species quite distinct from others in eastern Australia.

2. *Hovea linearis* (Sm.) R. Br., in W.T. Aiton, Hortus Kew. edn 2, 4: 275 (1812). — *Poireta linearis* Sm. (basionym), Trans. Linn. Soc. 9: 304 (1808), comb. illeg. — TYPE: n.v.

H. heterophylla A. Cunn. ex Hook. f., Fl. Tasmaniæ 1: 93, Pl. 15 (1860). — ISOTYPE: ex BM; Hobarton; Gunn 139, 12.9.1839 (NSW !), or Hobart, Gunn 139, 15.9.1840 (NSW !).

H. heterophylla f. *decipiens* Domin, Biblioth. Bot. 22 (89²): 729 (1925). — TYPE (? ISOSYNTYPE): near Brisbane, A. Dietrich s.n., 1863-5 (NSW !).

A sparse, procumbent or erect shrub less than 1 m in height, characterised by: *stem pubescence* of more or less dense, long, antrorse hairs; *leaves* ovate or elliptical near the base of the plant, linear above, the lower surface sparsely pubescent with long, antrorse hairs, the upper glabrous and usually minutely bullate; *inflorescence* an axillary cluster, very rarely with growth extending from the apex (auxotelic); flowers subsessile, usually only one or two in the cluster; *bract* and *bracteoles* c. 1.5 mm apart, narrow, the bracteoles shorter than the calyx, their tips often recurved; *seed* with a short aril, its tip out-turned.

DISTRIBUTION: Throughout the Coast, Tablelands and Western Slopes, probably of common occurrence but often overlooked; also in Queensland, Victoria, Tasmania and South Australia; usually in open eucalypt forest.

The Type material of *H. heterophylla* cited above is conspecific with *H. linearis* but may represent a taxon of infraspecific rank within *H. linearis*.

3. *Hovea rosmarinifolia* A. Cunn., in Field, Geogr. Mem. New South Wales: 348 (1825). — *H. longifolia* R. Br. var. *rosmarinifolia* (A. Cunn.) Benth., Fl. Austral. 2: 173 (1864). — TYPES (? ISOSYNTYPES): NW. of Bathurst, Cunningham 119, 1822 (NSW !); near Bathurst, Cunningham 270, 1817 (NSW !).

A shrub usually 1–1.5 m in height, characterised by: *stem pubescence* consisting of a dense understorey of curved or crinkled hairs, with occasional longer, straight, projecting hairs (especially near the stem apex or on younger stems); *leaves* usually less than 3 cm long, smooth or scabrid, much recurved to conceal almost all but the midrib below, usually strongly reticulate above, with the pubescence of the lower surface where not obscured rather sparse, of curled or crinkled hairs; *inflorescence* a sessile cluster, not extending from the apex (anauxotelic); *bract* and *bracteoles* cymbiform, very narrow-ovate (length:breadth = 6:1), recurved at the apex and with other characters as given in the key; *seed* with a short aril, its tip out-turned.

DISTRIBUTION: Central Tablelands and Central Western Slopes, often on rather poor, sandy soils.

H. rosmarinifolia is treated here as a discrete, regional population. However, specimens which are strikingly similar to *H. rosmarinifolia* but with atypical combinations of some of its characters with others of *H. purpurea* and/or of *H. "sp. P"* occur on Barrington Tops and on the Southern Tablelands. These, in the absence of conclusive evidence of relationship, have been referred, as atypical, to *H. purpurea*, a species with much variation (largely regional) over its wide range. The status of *H. rosmarinifolia* requires reassessment in relation to *H. purpurea* and *H. "sp. P"*.

The name *H. rosmarinifolia* has been misapplied to several forms of *H. purpurea* q.v., by Willis, Handb. Pl. Victoria 2: 282 (1973), and by Burbidge & Gray, Fl. Austral. Cap. Territory: 220 (1970).

4. *Hovea "sp. P"*. — EXAMPLE: 6 km NE. of Cabramurra, Briggs 4378 & Johnson, 17.10.1971 (NSW).

A shrub with slender and many-stemmed forms of diverse height, from 0.3–3.5 m, usually 1–3 m, characterised by: *stem pubescence* as in *H. rosmarinifolia* but with the long hairs perhaps more numerous, soon eroded shorter, sometimes weaker (the stems almost villous), finally lacking; *leaves* usually 1–2 cm long, conspicuously reticulate, the upper surface often scabrid from projecting vein-junctions; the lamina arched up from the midrib and recurved, but the margins less revolute than in *H. rosmarinifolia*, exposing some of the undersurface and its rather sparse pubescence of curled and/or crinkled hairs; *inflorescence* as in *H. rosmarinifolia*; *bract* and *bracteoles* conspicuous, narrow-ovate, acute to acuminate and with other characters as given in the key; *seed* as in *H. rosmarinifolia*.

DISTRIBUTION: Southern Tablelands, and in northeastern Victoria; usually in shady habitats such as gullies and creek banks in montane forests.

H. "sp. P" is treated here as a discrete, regional population, but there are more or less intermediate specimens from the Brindabella Ranges and the area to

their west, indicative of relationship with *H. rosmarinifolia* and through it with *H. purpurea*. These bring the specific rank of *H. "sp. P"* into question, and reassessment in relation to *H. purpurea* (as with *H. rosmarinifolia* q.v.) is required.

5. *Hovea purpurea* Sweet, Fl. Australasica t. 13 (1827). — TYPE: n.v.; from data in the protologue this species is identified with the following EXAMPLE: Cowan, L. K. Metcalfe NSW 95328, 10.9.1966 (NSW).

H. pannosa A. Cunn. ex Hook., Bot. Mag. 58: t. 3053 (1831). — *H. longifolia* R. Br. var. *pannosa* (A. Cunn. ex Hook.) Benth., Fl. Austral. 2: 173 (1864). — TYPE (ISOTYPE, ex BM): north of Bathurst, N.S.W., A. Cunningham 187, 1822 (NSW).

H. longifolia R. Br. f. *aspera* Williamson, in Ewart, Fl. Victoria: 665 (1931). — TYPE: n.v.

H. rosmarinifolia A. Cunn. var. *villosa* J. H. Willis, Muelleria 1 (3): 127 (1967). — TYPE (part of HOLOTYPE): Mt Kaye, Vic., J. H. Willis & N. A. Wakefield, 16.10.1948 (NSW!).

A shrub 1 m to more than 3 m in height, characterised by: stem villous, the pubescence predominantly of long, spreading, more or less straight or crinkled hairs, eroding shorter and then more or less appressed; in some regional variants with a pubescence like that of *H. rosmarinifolia* and *H. "sp. P"*; leaves usually narrow-elliptical, shortly acute, or obtuse, at the apex, and rounded at the base, often 3–4 cm long (but with many variants); upper surface finely reticulate, the primary lateral veins not manifestly distinct from the smaller ones; lower surface often notably ferruginous, with some curled hairs but predominantly villous; inflorescence and flowers as given in the key, the calyx, like other parts, villous with fine, softly spreading hairs, or varying with the stem pubescence; bract and bracteoles variable in length but often recurved, exposing the paler, adaxial surface; seed with a short aril, its tip out-turned.

DISTRIBUTION: Widespread through the Coast and Tablelands, and in the North and Central Western Slopes; also from North Queensland (Cook District) to Victoria; in both exposed and sheltered situations, on sandy, often rocky, slopes, especially on sandstone and granite.

H. purpurea is a widespread and variable species. While it maintains a fairly uniform character in parts of its range (especially the Central Coast and Blue Mtns), it shows variation which is apparently regional (and/or habitat-related) in others (e.g. Northern Tablelands and far North Coast). Isolated and conspicuous variants appear occasionally. Specimens with atypical combinations of characters relate *H. purpurea* to *H. rosmarinifolia* and/or *H. "sp. P"* q.v. These taxa, with further study, may prove to be more appropriately treated as subspecies.

This species has often been the subject of misapplied names, largely owing to Benthams inclusion of it in *H. longifolia* as a synonym of var. *pannosa*. It has been named *H. rosmarinifolia* A. Cunn. var. *rosmarinifolia* by Burbidge & Gray, Fl. Austral. Cap. Territory: 220 (1970); *H. rosmarinifolia* by Willis, Handb. Pl. Victoria 2: 282 (1973) and *H. pannosa* A. Cunn. ex Hook., a later synonym, by Beadle, Evans & Carolin, Handb. Vasc. Pl. Sydney Distr. 252 (1963), and Fl. Sydney Region: 300 (1972).

An undescribed species (*H. "sp. X"* at NSW) widespread in central and southeastern Queensland has been consistently called *H. pannosa* or *H. longifolia* var. *pannosa* in that State.

6. *Hovea acutifolia* A. Cunn., in G. Don, Gen. Hist. Dichl. Pl. 2: 126 (1832). — TYPE (ISOTYPE, ex BM): W. of Mt Warning, Cunningham 60, 1827 (NSW!).

A slender-stemmed bushy or tree-like shrub, up to 4 m or more in height, characterised by: *stem pubescence* dense, of curled and softly crinkled hairs, but with some longer, almost straight, and projecting beyond a shorter understorey; only occasionally with the stem villous; *leaves* elliptical, evenly tapered at apex and base, often 3–7 cm long and 10–15 mm broad (but many narrower, 5–10 mm); upper surface as in *H. purpurea*, the lower with curled, or longer crinkled or straight, hairs predominating; *inflorescence* and flowers as given in the key, the calyx with rather long, loosely appressed hairs (rarely villous); *bract* and *bracteoles* not usually recurved from the ealyx, and with its pubescence; *seed* with a long aril, its tip not free from the testa.

DISTRIBUTION: Only in the North Coast, as far south as the Manning R. district, but also in the Darling Downs and Moreton Districts of Queensland; often associated with rainforest margins or similar favourable conditions such as watercourses, deep sand, fertile soils, etc.

H. acutifolia is most closely related to *H. longifolia* which it appears to replace in the North Coast and Queensland.

7. *Hovea* "sp. O". — EXAMPLE: Gibraltar Range National Park, 67 km E. of Glen Innes, Coveny 2221, 2.10.1969 (NSW).

A shrub from less than 1 m to more than 2 m in height, characterised by: *stems* villous, as in *H. purpurea*; *leaves* mostly elliptical but sometimes more or less oblong, with the apex acute or quite obtuse; often 3–5 cm long and 1–1.5 cm broad, the lamina flat with only the margins often slightly recurved, the venation and surfaces as in *H. purpurea*; *inflorescence* of subsessile flowers clustered at the top of a stout, densely villous, often dark-coloured peduncle; with characters given in the key; *seed* with a short aril, its tip out-turned.

DISTRIBUTION: Northern Tablelands and eastern escarpment of the Great Divide within the North Coast, also in southern Queensland (Wallangarra); in open eucalypt forest, often recorded from hillsides of light sandy or granitic soils.

8. *Hovea* "sp. Q".

H. purpurea Sweet var. *montana* Hook. f., Fl. Tasmaniae 1: 93 (1860). — *H. longifolia* R. Br. var. *montana* (Hook. f.) Willis, Muelleria 1: 127 (1967). — TYPE (? ISOTYPE): Marlborough, J. D. Hooker, herb. Gunn. 800/1842, 17.10.1840 (NSW!).

A shrub with a dense canopy of leaves and branches but low stature, often less than 1 m in height, and 1–1.5 m diam. with the outer stems somewhat decumbent; characterised by: *stem pubescence* at first of rather dense, loosely appressed to spreading, crinkled hairs, soon eroding to show only shorter, more appressed remnants on glabrescent stems; *leaves* much arched up from the midrib and recurved, mostly 2–3 cm long; *inflorescence* a sessile or subsessile axillary cluster, with flowers as in the key; *bract* and *bracteoles* oblong (length:breadth = 2:1, 3:1), the bracteoles about half as long as the calyx tube; *seed* with a short aril, its tip out-turned.

DISTRIBUTION: At high altitudes in the Southern Tablelands, usually on grassy slopes or in snowgum woodlands, with a form in the Central and Northern Tablelands which appears to differ only in dimensions of the flower parts, especially of bract and bracteoles; also at high altitudes in Victoria and widespread in Tasmania.

This species, as represented in the Australian Alps and Tasmania, has long been regarded as specifically distinct (see Thompson, Telopea 2 (3): 265, 322 (1981)), but a binomial has never been published; instead it has been accepted at varietal rank in two different though long-confused species, *H. purpurea* and *H. longifolia*. It was included by Curtis, Stud. Fl. Tasmania 1: 144 (1956), and by

Willis, Handb. Pl. Victoria 2: 282 (1973), in mixed concepts of *H. longifolia*. In these States, though its name has been used to include a number of taxa, *H. longifolia* does not occur.

9. *Hovea longifolia* R. Br., in W. T. Aiton, Hortus Kew. edn 2, 4: 275 (1812). — *H. longifolia* R. Br. var. *normalis* Benth., Fl. Austral. 2: 173 (1864), at least as to Sieber 376 (upper specimen only), (NSW). — TYPE: n.v.; a specimen at MEL (MEL 1520374 !), bearing the name *H. longifolia* and the locality Lane Cove, both in Brown's hand, and a second label "From Kew Museum Near London. Coll. by R. Brown", may be part of the collection from which the Type plant was grown.

A tall shrub, often 1.5–2 m in height, characterised by: *stem pubescence* sometimes with longer hairs projecting beyond a shorter, denser understorey, sometimes with long hairs loosely appressed and concealing any understorey; *leaves* arched up from the midrib and considerably recurved so as to appear narrow-linear to -oblong, often more than 5.5 cm long, glossy above, sparsely pubescent with curled hairs below; *inflorescence* a sessile cluster but the flowers pedicellate and often in twos or threes, the pedicels divergent and with dark (black) hairs; *bract* and *bracteoles* ovate to oblong, shortly acute at the apex, the bracteoles sometimes a little below the receptacle, shorter than the calyx tube and sometimes very short; *seed* with a long aril, the tip not free.

DISTRIBUTION: Commonly collected but almost entirely within the Central Coast, extending beyond this only into the adjacent areas of Port Stephens (North Coast) and Bundanoon-Wingello (southern Central Tablelands); usually on shaded, moist creek slopes and banks.

This species maintains its distinctness as a relatively uniform taxon, restricted both in range and habitat. It is most closely related to *H. acutifolia*, an allopatric species which is found in similar habitats of the North Coast and southern Queensland, where a few confusing phenotypes occur, e.g. at Coramba and also at Mt Greville.

The name *H. longifolia* has been widely used for other species, e.g. *H. "sp. Q"* and *H. purpurea* qqv., as well as for other species not occurring in New South Wales, some at least of which are undescribed.

10. *Hovea lanceolata* Sims, Bot. Mag. 38: t. 1624 (1813). — *H. longifolia* R. Br. var. *lanceolata* (Sims) Benth., Fl. Austral. 2: 173 (1864). — TYPE: n.v.; from data in the protologue this name can be associated with a form of the species with large leaves and flowers clustered in the axils, found in central New South Wales. — EXAMPLE: Sccone district, Mort NSW 117351, 8.1963 (NSW).

H. apiculata A. Cunn., in G. Don, Gen. Hist. Dichl. Pl. 2: 126 (1832). — TYPE (ISOTYPE, ex BM): Hunter's R., Cunningham 50, 8.1827 (NSW !).

A tall shrub often 1.5–2 m in height, characterised by: *stem pubescence* as given in the key; *leaves* narrow-ovate (lanceolate), but varying to narrow-oblong and elliptical, often 5 cm or more in length in New South Wales but occasional regional forms with smaller leaves occurring throughout the range of the species, these tending to be atypical also in being less flat or V-shaped in section; the apex shortly acute to obtuse or even retuse, the undersurface grey-brown and closely felted; *inflorescence* a raceme reaching a length of 5 cm or more with numerous flowers, or condensed to a fewer-flowered cluster in the axils (as in the Type), both forms occasionally on the one plant; *bract* and *bracteoles* narrow-obtuse, always close together, the bracteoles shorter than the calyx tube and usually not recurved, inserted at the base of the receptacle and sometimes adnate to it for the whole length of the receptacle; *seed* with a short aril, the tip out-turned.

DISTRIBUTION: Common in the North and Central Western Slopes, only occasional in the North and Central Coast, North and Central Tablelands, South Western Slopes and North Western Plains; usually on sandy soils, especially on rocky outcrops and ridges; also in Queensland, Tasmania and (?) South Australia.

Variant forms occur throughout the range of the species. A few apparent hybrids, with some characters of *H. linearis*, have been collected in the Warialda district. Material from Tasmania is somewhat atypical for *H. lanceolata* and suggests a relationship with *H. "sp. Q"*. Curtis, Stud. Fl. Tasmania 1: 144 (1956), includes this taxon, together with *H. "sp. Q"*, in *H. longifolia*, a species which does not occur in Tasmania. *H. lanceolata* is recorded from South Australia.

11. *Hovea* "sp. R". — EXAMPLE: Watchimbark Ck, "Myra", NW. of Gloucester, Blaxell 8 & Coveny, 22.9.1968 (NSW).

A shrub 2 to more than 3 m in height, characterised by: *stem pubescence* as in *H. lanceolata*; leaves very narrow-ovate (length:breadth = 6 : 1), the apex obtuse or short-acute, scarcely tapered to a rounded base, the lamina slightly folded up and recurved, but the margins scarcely recurved, the lower surface rather sparsely pubescent with curled (some loosely) hairs, the upper surface glossy, reticulate, the primary lateral veins usually slightly retrorse; *inflorescence* as in some forms of *H. lanceolata*, the flowers racemose or clustered; *bract* and *bracteoles* more or less ovate (length:breadth = 2:1, 3:1), closely pubescent like the calyx and stems; bract 3–10 mm below the bracteoles and adnate to the pedicel for c. 3–5 mm; bracteoles about half as long as the calyx; *pod* and *seed* seen only in the very young state, the pod then densely pubescent with crinkled hairs.

DISTRIBUTION: On the eastern escarpment of the Mount Royal Range, on sheltered slopes of poor stony hills, on serpentine.

A taxon related to *H. lanceolata*, of questionable rank in the light of the great variation within *H. lanceolata*, but with some constancy in its characters and, from the three collections known, of restricted range. It shows an apparently close resemblance to, but a significant distinction in the calyx-form from, an undescribed taxon (*H. "sp. W"* in NSW) in the Leichhardt District of Queensland (Carnarvon Ranges, Blackdown Tableland, etc.).

26. CROTALARIA L.†

Sp. Pl.: 714 (1753).

[Greco-latin: *crotalum*, a rattle, castanet — the seeds rattle in the pod.]

Literature: Lee (1978); Polhill (1968, 1971, 1976); Thompson (1961); see page 178.

Shrubs, undershrubs or small trees, usually soft-wooded, or herbaceous; annual to perennial. Leaves simple, or digitately compound with 1, 3 or up to 7 leaflets. Inflorescence terminal, leaf-opposed, or less commonly axillary; a raceme (sometimes aberrant in order of flower-opening), occasionally a panicle, or reduced to small clusters or even to a solitary flower. Calyx usually with 5 ± equal lobes, occasionally with 3 by fusing of the lateral lobes on each side, or 2-lipped, the tube regular or asymmetrical by protraction on the lower side. Petals usually yellow, or greenish, occasionally blue or white, sometimes marked with red, orange or black veins, or with a generalised flush, most often in the standard, the standard with a pair of calli (and sometimes some hairs) near the base inside, and sometimes

†by A.T. Lec.

pubescent outside, the wings with characteristic crescent-shaped folds of tissue, the keel rounded or angular along the lower edge, terminating in a bilaterally symmetrical or twisted, usually prominent, beak. *Stamens* 10, joined in a sheath open along the adaxial side at least at the base, the anthers dimorphic, five long and basifixated alternating with five short and dorsifixed. *Ovary* sessile to conspicuously stipitate, the style curved within the keel, or strongly geniculate (sometimes extruded between the bases of the keel petals), bearded adaxially (and sometimes obscurely also on the abaxial side), the stigma small, terminal, or rarely bilobed. *Pod* sessile to long-stipitate, inflated, from very small and 1-2-seeded, to quite large with many seeds, dehiscent but sometimes tardily, holding the seeds loose within. *Seeds* usually oblique-cordiform and without a significant aril, the radicular lobe often characteristically hook-like.

A genus of about 550 species; pantropical and subtropical especially in the southern hemisphere, with its greatest development in tropical Africa (nearly 400 species) and with many species in southeastern Asia but only about 15 recorded as native to Australia. In New South Wales naturalized species are about twice as numerous as natives, the latter falling easily into the classification devised by Polhill in a recent review (1968), though their paucity obscures relationships.

For many species of *Crotalaria* included here, it was not practicable to observe full typification procedures. Where Types were not readily available, a selected specimen from NSW ("EXAMPLE") was determined by L. Pedley, a former Australian Botanical Liaison Officer at the Herbarium, Kew, from material at Kew, sometimes in consultation with R.M. Polhill, whose published treatment of *Crotalaria* (1968) includes details of typification.

Details given here concerning the locations of Types of African species naturalized in New South Wales, as well as many other measurements, are quoted from the same author (1971). It should be noted that plants of tropical species growing in this more temperate climate usually exhibit smaller dimensions than their tropical counterparts.

Toxicity to both man and beast in species of *Crotalaria* has long been recognized, and there are many references in the literature to suspected or proven cases. Recent phytochemical work has identified alkaloids, amino acids and flavonoids, some known to be poisonous, from the seeds, bark, flowers and/or leaves of a number of species of *Crotalaria*; in this genus the toxic principles are alkaloids and amino acids, the flavonoids identified being probably physiologically inert (pers. comm., E. Lassak, Biol. & Chem. Res. Inst., Rydalmere, N.S.W. 2116). Publications by many authors, including C.K. Atal, E.A. Bell, S. Nagarajan, D.J. Pilbeam and S.S. Subramanian, in *Phytochemistry*, since c.1970, provide references.

1. Keel bilaterally symmetrical, the beak not twisted.
2. Receptacle prominently developed, 3-9 mm long. Flowers greenish yellow, the keel c. 4 cm long. Leaves 3-foliolate, glabrous in Australian material .. *C. agatiflora* ssp. *agatiflora* 1.
- 2.* Receptacle insignificant, up to 2 mm long. Flowers yellow or blue, or if greenish and c. 3-5 cm long then the standard with dark striae and the leaves usually unifoliolate and pubescent. Leaves 1- or 3-foliolate.
 3. Calyx distinctly more than half as long as the keel. Leaves 1-3-foliolate.
 4. Stipules filiform *C. incana* 2.
 - 4.* Stipules more or less leafy *C. goreensis* 3.
 - 3.* Calyx less than half as long as the keel (or wings if they are longer than the keel). Leaves 1- or 3-foliolate.

5. Standard clear yellow, without markings. Leaves 1–3-foliolate. (Native plants of the Western Slopes and Plains.)
6. Leaves always trifoliolate, the laterals at least half as long as the terminal leaflet, glabrous above. Pubescence variable but foliage-aspect chiefly green in the subspecies in New South Wales. Plants of black and other heavy soils, usually less than 0.5 m high *C. dissitiflora* ssp. *dissitiflora* 4.
- 6.* Leaves 1–3-foliolate, the laterals usually much reduced or lacking but occasionally (perhaps quite commonly along the S.A.–N.S.W. border) up to half as long as the terminal leaflet, very rarely slightly more, always with some hairs above. Pubescence in the subspecies in N.S.W. variable but often dense, the foliage then with a greyish aspect. Plants of sandy soil, often growing to 1 m high. *C. eremaea* ssp. *eremaea* 5.
- 5.* Standard striate with darker or blackish lines. Leaves always trifoliolate. (Naturalized species in the North Coast.)
7. Leaflets usually ± obovate, broadest above the middle. Bracts falling before the flowers are fully open. Calyx tube with a sparse, short, obscure pubescence *C. pallida* var. *obovata* 6.
- 7.* Leaflets usually ± elliptical, broadest near the middle. Bracts persistent. Calyx tube glabrous or pubescent.
8. Calyx tube pubescent. Keel 6.5–11 mm long, narrow (2 mm). Pod 4–6 mm diam *C. lanceolata* ssp. *lanceolata* 7.
- 8.* Calyx tube glabrous. Keel 12–13 mm long, 4–5 mm broad. Pod 7–11 mm diam *C. zanzibarica* 8.
- 1.* Keel asymmetrical by spiral twisting, sometimes rather slight, of the beak at its apex.
9. Calyx 2-lipped, nearly equal to the corolla in length. Leaves simple.
10. Ovary hairy, the pod 2.5–5.5 cm long. Leaves 6–10 cm long. Plants erect *C. juncea* 9.
- 10.* Ovary glabrous, the pod 6–7 (–11) mm long. Leaves up to c. 3 cm long. Plants decumbent or prostrate *C. montana* 10.
- 9.* Calyx not 2-lipped but often slightly asymmetrical with the tube protracted on the lower side, distinctly shorter than the corolla. Leaves simple, or 1- to 7-foliolate.
11. Pod several- to many-seeded, usually more than 1 cm long. Leaves not 3-foliolate.
12. Keel rounded, the curve greatest near the middle, the tip of the beak sometimes incurved, the style usually following its curve. Leaves simple, 1- or 5–7-foliolate.
13. Leaves 5–7-foliolate *C. grahamiana* 15.
- 13.* Leaves simple or unifoliolate.
14. Leaves simple. Plants erect. (Species rarely found west of the Western Slopes Divisions.)
15. Flowers small (up to 1.1 cm long), often crowded in the inflorescence. Stipules narrow, linear to narrow-ovate. (A native plant, chiefly in northern subdivisions of the State.) *C. nuttallii* 12.
- 15.* Flowers larger (1.5–3 cm long), not noticeably crowded. Stipules semilunar to subcordate. (Introduced species.)
16. Ovary with some hairs. A tall grey-green shrub or small tree with the young stems and underside of leaves densely pubescent but becoming glabrous. (In or escaped from gardens.) *C. semperflorens* 11.
- 16.* Ovary glabrous. A shrub up to 2 m tall, with stems and leaves always glabrous. (Widely naturalized in tropical, coastal districts, extending into northern New South Wales.) *C. spectabilis* 14.
- 14.* Leaves unifoliolate. Plants decumbent to prostrate. (Sand dwellers of Central Australia, extending into the extreme northwest of New South Wales.) *C. smithiana* 13.
- 12.* Keel bent upwards at right angles from below the middle, the beak not or scarcely incurved at the tip, the style geniculate within the keel and often constricted at the bend. Leaves 1- or 3-foliolate.
17. Flowers 3–5.5 cm long, greenish *C. cunninghamii* 16.
- 17.* Flowers usually less than 2 cm long, yellow.
18. Racemes of 1–6 flowers, in axils of the upper leaves *C. virgulata* 17.
- 18.* Racemes of at least 8–10 flowers, terminal and leaf-opposed *C. distans* 18. (see also *C. macaulayae*, under *C. virgulata*)
- 11.* Pod 2-seeded, c. 5 mm long. Leaves 3-foliolate *C. medicaginea* 19.

1. **Crotalaria agatiflora* Schweinf. in Hoehnel, Zum Rudolf-See und Stephanie-See, Anhang: 13 (1892); N.E. Brown, Bot. Mag. 139: t. 8505 (1913); Polhill, Kew Bull. 22 (2): 202 (1968), in Milne-Redhead & Polhill (eds), Fl. Trop. E. Africa (Leguminosae, Papilionoid.): 850 (1971); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — TYPE: n.v. (B, destroyed). — EXAMPLE: Hornsby Heights near Galston Road, Lee NSW 114044, 5.1970 (cult.).

Soft-wooded undershrubs to small trees, 1–10 m tall, much branched, the stems glabrous to tomentose. Leaves digitately trifoliolate with elliptic to narrow-ovate or ovate leaflets on long petioles and the stipules, if present, linear, caducous and 4–12 mm long. Leaflets mostly 3.8–6.7 cm long, 2–3.5 cm broad, glabrous or variously pubescent. Inflorescence a many-flowered, decorative, terminal raceme up to 40 cm long, the flowers c. 2–5.5 cm long, subtended by subulate to subcircular, acuminate to long-eaudate bracts up to 4 cm long and 3 cm broad, readily deciduous, the bracteoles filiform to narrow-ovate or slightly hastate, attenuate, 0.5–2.9 mm long, up to 8 mm broad, inserted on the pedicel. Calyx much shorter than the keel, 16–30 mm long, contracted into a prominent receptacle 2–9 mm long, glabrous or pubescent, the upper and lateral teeth on either side almost completely joined and about twice as long as the tube. Petals greenish, the standard ovate, slightly greenish yellow, sometimes with pubescence on the centre-back, the wings shorter than the keel, the keel broadly rounded near its middle, the beak not twisted, narrow, c. 4 cm long, often greenish or purplish. Pod subcylindrical, gradually narrowed into the stipe, glabrous, 7.5–10 cm long, 1.2–2 cm diam., with many oblique-cordiform, pale brown, smooth seeds 6–7 (–9) mm long, not seen in Australian specimens. Chromosome number: $2n = 16$ (Boulter et. al., New Phytol. 69: 117–131 (1970)).

DISTRIBUTION: Cultivated and sometimes escaped from gardens in coastal areas of New South Wales and probably of other States. Native in tropical east and central Africa.

Four subspecies are recognised in Africa, only one of which is naturalized in New South Wales.

C. agatiflora ssp. *agatiflora*; Polhill, I.c. (1968, 1971).

Differs from the other subspecies in its stature, being rarely more than 2 m; leaflets ovate to elliptical or broad-elliptical, usually less than twice as long as broad; bracts linear to narrow-ovate, attenuate, 1–6 (–9) mm long but usually fallen; and bracteoles filiform, 0.5–3.5 mm long. Fl.: chiefly in Autumn (in specimens observed).

DISTRIBUTION: As for the species in New South Wales; this subspecies is native and common in the highlands of Kenya, extending into Ethiopia.

CENTRAL COAST: Pennant Hills along railway line, Boersma NSW 116370, 4.1974; Hornsby Heights near Galston Rd, Lee NSW 114044, 5.1970 (cult.).

C. agatiflora has (in Australia) often been misdetermined as, and confused with, *C. laburnifolia*, which is not known to be naturalized in New South Wales though long ago recorded for tropical areas in Queensland and Western Australia. *C. laburnifolia* is similar in habit and general appearance to *C. agatiflora*, differing in its smaller flowers, 2 cm or less, with the keel deeply rounded, its beak not more than 2 em long; and in its acute, usually ovate or broad-ovate leaflets (Kaur in Bull. Lucknow Natl. Bot. Gard. 87: Pls 2, 3 (1964)).

Early records of toxicity must be suspect because of this past confusion. There seems now to be no evidence of toxicity attaching to either of these species; the "walkabout" or Chillagoe disease attributed to *C. laburnifolia* by Bailey, Compr. Cat. Queensland Pl.: 133 (1913), followed by Webb, CSIR Bull. 232: 81

(1948), and Everist, Poison Pl. Australia: 295 (1974), is now ascribed to other species, *C. retusa* and/or *C. crispata* (cf. Everist, l.c. pp. 287, 290).

2. **Crotalaria incana* L., Sp. Pl.: 716 (1753); Candolle, Prodr. 2: 132 (1825); F. Mueller, Fragm. 3: 52 (1862), Syst. Arrangement Carpenterian Pl.: 114 (1863), App. in Laurie (ed.), Landsborough's Explor. Australia; Bentham, Fl. Austral. 2: 183 (1864); F. Mueller, Fragm. 9: 157 (1875); J.G. Baker in J.D. Hooker, Fl. Brit. India 2: 83 (1876); F.M. Bailey, Syn. Queensland Fl.: 98 (1883); Tate, Handb. Fl. Extratrop. South Australia: 223, 301 (1890); Moore & Betche, Handb. Fl. New South Wales: 145 (1893); Tate, Part III (Sect. II, Botany): 152 (1896) in Spencer (ed.), Rep. Work Horn Sci. Exped. Centr. Australia; F.M. Bailey, Queensland Fl. 2: 376 (1900); Maiden & Betche, Census New South Wales Pl.: 106 (1916); Ewart & Davies, Fl. Northern Territory: 141 (1917); Domin, Biblioth. Bot. 22 (89²): 735 (1925); Gardner, Enum. Pl. Austral. Occid.: 62 (1930); Milne-Redhead, Kew Bull. 15: 159 (1961); Backer, Fl. Java 1: 585 (1963); Beard (ed.), Descriptive Cat. W. Austral. Pl.: 45 (1965), edn 2: 65 (1970); Polhill, Kew Bull. 22 (2): 217, etc. (1968), in Milne-Redhead & Polhill (eds), Fl. Trop. E. Africa (Leguminosae, Papilionoid.): 869 (1971); Chippendale, Proc. Roy. Soc. New South Wales 96: 239 (1972); Beadle, Stud. Fl. N.E. New South Wales 3: 395, Fig. 176 B1 (1976); Jacobs & Pickard, Pl. New South Wales: 119 (1981); see also under the subspecies.
— TYPE: n.v. (BM). — EXAMPLE: Inglewood, Queensland, Boorman NSW 45952, 3.1911.

[Australian authors have not distinguished subspecies in *C. incana*, and most of the above references do not make clear whether they are to the comprehensive species or to one (and if so which) of the subspecies.]

A somewhat bushy, erect to spreading, soft-wooded shrub 1.5–4 m tall (to c. 2 m in New South Wales), with an indumentum of either short and curved-ascending, or long and spreading hairs on the stems and leaves. Leaves trifoliolate, on petioles up to 8 cm long, with usually persistent, and sometimes long, filiform stipules. Leaflets obovate to elliptical or broad-elliptical, often folded up along the midrib and deflexed on the petiole in herbarium specimens, sometimes very small but usually 2.5–5 cm long and 1.5–4.5 cm broad, glabrous above, subglabrous to sparsely pilose below. Inflorescence a raceme, usually leaf-opposed, recorded up to 30 cm long and with 60 flowers, but in New South Wales smaller, with few (c. 10) flowers; flowers subtended by linear bracts and with a pair of similar bracteoles inserted at the top of the pedicel and curved upwards against the calyx; pedicel c. 3 mm long. Calyx nearly as long as the keel, its base retracted to envelop the top of the pedicel, the teeth subglabrous to spreading-pilose, narrow-triangular with a distinct median vein, about twice as long as the tube, the upper teeth usually slightly broader than the lowest with occasional irregular coherence of the lowest three; receptacle not prominent. Petals yellowish, the standard yellow with dark reddish or purplish veining, or sometimes flushed with purple as the dominant colour, scarcely exceeding the calyx, 8–15 mm long, glabrous outside or with a few hairs along the rather prominent midvein, the calli extending onto both lamina and claw, the wings and keel about equal in length, or the wings slightly shorter, mostly about 8–9 mm long in the specimens seen, the keel with a right-angled bend in its lower half, 8–11.5 mm long, with a more or less conspicuous narrow band of woolly hairs along the upper margin, the beak not twisted, c. 6–8 (–11) mm long. Ovary with long, dense, rather stiff, yellowish hairs, sparser, spreading and softer in the fruit. Pod sessile but shortly tapered at the base, subcylindrical or oblong-clavate, many seeded (40–50), and with a short, persistent hook from the style base, mostly 3–4.5 cm long. Seeds oblique-cordiform or almost triangular in outline, smooth or

obscurely papillose, mottled brown or dark olive green, c. 2–3 mm long. *Chromosome number*: $2n = 14$ (Atchison in Darlington & Wylie, Chromosome Atlas of Flowering Plants, edn 2 (1955)). Fl. & fr.: in most seasons, least in Spring.

DISTRIBUTION: First collected in Australia (Queensland: Keppel Bay) by R. Brown (1802–5) and now occurring in New South Wales and Queensland, mostly but not exclusively in coastal districts, and recorded also in Western Australia and the Northern Territory. There is one old specimen from inland South Australia at NSW.

Pantropical, native in Africa and possibly America, probably adventive elsewhere; in Africa the variation is related to distribution.

There are several records of suspected stock poisoning by this species, though only one is supported by a specimen permitting determination of the subspecies involved, viz. ssp. *incana*. Evidence is conflicting, however, and a limited feeding test gave negative results. Overseas there is a record of natural poisoning of sheep and cattle, and an alkaloid is known to be present [see Hurst Poison Pl. New South Wales: 155 (1942); Webb, CSIR Bull. 232: 81 (1948); Watt & Breyer-Brandwijk, Med. Poison. Pl. S.E. Africa, edn 2: 579, 586 (1962); Evert, Proc. Roy. Soc. Queensland 74: 13 (1964), Poison. Pl. Australia: 295 (1974).]

Two subspecies are recognised, both present in New South Wales.

1. Stem hairs short, pale to golden, nearly all ± crinkled, at first curved-ascending, later variously directed, the pubescence extending less than 1 mm from the stem; bracts 1–3 mm long, stipules 2–4 mm long, calyx lobes 5–6 mm long and subglabrous ssp. *incana* a.
- 1.* Stem hairs 1.5–2.5 mm long, golden to brown, spreading horizontally, few not ± straight; bracts mostly 4–10 mm long, stipules 4–15 mm long; calyx lobes 6–9 mm long and spreading-pilose with hairs like those of the stems ssp. *purpurascens* b.

a. *C. incana* ssp. *incana*; Polhill, l.c. (1971); Jacobs & Pickard, Pl. New South Wales: 119 (1981).

C. incana L. f. *glabrescens* Wilczek, Bull. Jard. Bot. État 23: 147 (1953), Fl. Congo Belge 4: 150 (1953). — TYPE: n.v. (BR).

Diagnostic characters as given in the key. Differs from ssp. *purpurascens* further in the seeds brown, mottled darker, obscurely papillose. *Chromosome number*: $2n = 14$ (Boulter et al., New Phytol. 69: 117–131 (1970)).

DISTRIBUTION: North Coast and Northern Tablelands of New South Wales and also in Queensland and northern South Australia; on sandy alluvial flats and river banks, perhaps tolerating drier conditions than ssp. *purpurascens*.

NORTH COAST: Brunswick R., Maiden & Boorman NSW 45950, 12.1908; Kyogle, Larkin NSW 45956, 5.1916; Lismore, Bäuerlen NSW 45947, 12.1894; Jackadgery, Coveny 1922, 8.1969; Toorooka (Upper Macleay R.), Noonan NSW 49544, 4.1958; Kempsey, Wilson NSW 45945, 4.1958 Inspector of Stock NSW 45953, 2.1909; Macleay R., Davis & Davis NSW 45954, 1.1941. **NORTHERN TABLELANDS:** Tenterfield, Cowin NSW 45957, 4.1917.

b. *C. incana* ssp. *purpurascens* (Lamk.) Milne-Redh., Kew Bull. 15: 159 (1961); Polhill, in Milne-Redhead & Polhill (eds), Fl. Trop. E. Africa (Leguminosae, Papilionoid.); 870 (1971); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — *C. purpurascens* Lamk. (basionym), Encycl. Méth. 2: 200 (1786). — TYPE: n.v. (P). — EXAMPLE: Wollongbar, Crofts NSW 45956, 8.1952.

C. schimperi A. Rich., Tentamen Fl. Abyssinicae 1: 151 (1847). — TYPE: n.v. (P).

C. incana L. f. *lanata* Wilczek, Bull. Jard. Bot. État 23: 147 (1953), Fl. Congo Belge 4: 150 (1953). — TYPE: n.v. (BR).

Diagnostic characters as given in the key. Differs also from ssp. *incana* in the dark olive-green, smooth seeds with a waxy pale area at the tip of the smaller, incurved process (seen only when mature).

DISTRIBUTION: Adventive in coastal areas in the northern half of New South Wales, perhaps also in Western Australia and the Northern Territory (see distribution of the species); in pastures and cultivation areas on basaltic, loamy and alluvial soils.

NORTH COAST: North Coast, ? Kyogle, Quirk NSW 113655, c. 1967; Wollongbar, Crofts NSW 45946, 8.1952; 5.4 km NW. of Alstonville, Coveny 4587, 9.1972; Duck Creek, 2 miles [3 km] S. of Alstonville, e. 8 miles [13 km] W. of Ballina, Constable 6475, 11.1965; near Rous Mill, 6.4 km SW. of Alstonville, O'Hara & Coveny 3487, 2.1971; Victoria Park 4 miles [6 km] SSW. of Alstonville, Clarke, Pickard & Coveny 1253, 7.1969; Lorne via Kendall, Steadman NSW 99950, 5.1968; Tarre, Noonan NSW 113656, 6.1964; Wang Wauk via Colongolook, Lewis NSW 116699, 4.1976. CENTRAL COAST: Dundas, spontaneous in plant nursery, Rumsey NSW 45957, 6.1916.

3. **Crotalaria goreensis* Guill. et Perr., Fl. Senegambiae Tentamen 1: 165 (1832); Wilczek, Fl. Congo Belge 4: 124 (1953); Polhill, Kew Bull. 22: 221 (1968), in Milne-Redhead & Polhill (eds), Fl. Trop. E. Africa (Leguminosae, Papilionoid.): 875 (1971); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — TYPE: n.v. (P.). — EXAMPLE: roadsides c. 10 miles [16 km] S. of Cairns, Queensland, Vickery NSW 113658, 6.1969.

An erect, soft-wooded annual or short-lived perennial up to 2.6 m high, somewhat rampant in growth (in Australia at least); stems finely ribbed, often single, but sometimes much-branched, with a more or less dense, appressed somewhat spreading pubescence of whitish to golden hairs becoming sparse with age. Leaves trifoliolate, very variable in size, often small and large intermixed on the stems, with petioles about equal to the longest leaflet, and narrow-semiovate, acuminate stipules usually 9–25 mm long, 3–7 mm broad, occasionally smaller. Leaflets obovate to elliptical, from less than 1 to over 8 cm long, often 2.5–3.5 cm, the terminal usually slightly longer than the laterals, glabrous or with a few hairs along the midrib and obscurely dotted above, more or less sparsely appressed-pubescent below. Inflorescence a raceme, the racemes in the upper axils, 1.5–15 cm (in New South Wales) –24 cm long, subtended by caducous linear bracts. Calyx 4–5 mm long, softly appressed-pubescent, the acuminate teeth about equal to the tube and to the linear, caducous bracteoles inserted just below the calyx tube. Petals mostly yellow, sometimes suffused with soft orange or red-brown, turning reddish then purplish on drying, the standard glabrous except for some hairs at the top of the claw, the wings more or less oblong, slightly shorter than the keel, the keel c. 7–10 (–11.5) mm long, with a conspicuous band of woolly hairs along the upper margin, the beak straight, not twisted, 5–7 mm long. Pod oblong-ellipsoid, the stipe shorter than the calyx tube and the remains of the style also very short, 15–20 mm long, softly appressed-pubescent, at first pale but becoming almost black. Seeds 12–16 in the pod, oblong-reniform, 2.5–4 mm long, the surface slightly uneven, minutely arillate in the sinus, more or less orange-red. Chromosome number: $2n = 16$ (Boulter et al., New Phytol. 69: 117–131 (1970)). Fl. & fr.: Autumn–Winter.

DISTRIBUTION: Naturalized in the North Coast of New South Wales, and in Queensland and the Northern Territory; commonly found along roadsides, in heavy and loamy soils. Native in tropical Africa.

NORTH COAST: Stokers Siding via Murwillumbah, Gattenby NSW 131124, 5.1970; Mummulgum, Sinclair NSW 99948, 4.1968; Valla (near Nambucca Heads), Mudat NSW 113657, 5.1968.

Webb, CSIR Bull. 232: 81 (1948), and Everist, Poison. Pl. Australia: 295 (1974), record early suspicion of stock poisoning by *C. goreensis*, but the plant was found to be not only very unpalatable (to sheep) but non-toxic in feeding tests and some chemical analyses. It has been introduced in the North Coast for trial as a pasture legume and source of green manure, being mentioned for the latter purpose by Uphof, Dict. Econ. Pl., edn 2:159 (1968).

4. *Crotalaria dissitiflora* Benth. in Mitchell, Trop. Australia: 386 (1848); Bentham, Fl. Austral. 2: 184 (1864); F. Mueller, Fragm. 3: 56 (1862), 9: 156 (1875); F.M. Bailey, Syn. Queensland Fl.: 98 (1883); Moore & Betche, Handb. Fl. New South Wales: 145 (1893); F.M. Bailey, Queensland Fl. 2: 376 (1900); Maiden & Betche, Census New South Wales Pl.: 106 (1916); Ewart & Davies, Fl. Northern Territory: 141 (1917); Domin, Biblioth. Bot. 22 (89²): 735 (1925); Polhill, Kew Bull. 22: 247 (1968); Beard, Wildfl. Northw.: 9 (c. 1972); Lee, Telopea 1 (5): 328 (1978); Jacobs & Pickard, Pl. New South Wales: 119 (1981); Jessop (ed.), Fl. Central Australia: 153 (1981); see also under the subspecies. — HOLOTYPE: Mitchell 459 (K !), photo (NSW !); see Lee, l.c.

[The binomial *C. dissitiflora* has been used very inexactly in the past, and in the foregoing references the taxa intended to be included under that name differ considerably; see *C. eremaea* below.]

Soft-wooded perennials of small stature, usually less than 30 cm high with several stems from the base, erect or decumbent, at first densely pubescent, becoming nearly glabrous with age. Leaves always trifoliolate, petiolate and stipulate, the stipules linear, spreading, persistent on at least some leaves but sometimes small and obscure, (0.5–) 1–3 (–5) mm long, or fallen, from old dried specimens. Leaflets of rather thin texture, often elliptical, or obovate or occasionally ovate (length:breadth = 2:1 or 3:2), the terminal often 15–30 (–40) mm long, the laterals more than half as long as the terminal, variously pubescent, the surfaces (or at least the upper) with minute dots clearly visible through any pubescence. Inflorescence of about 20 flowers in a raceme, the rachis 6 to more than 16 cm long and usually longer than the peduncle of 2 to more than 10 cm, the flowers ± rounded in outline (with rare exceptions), (7–) 8–11 (very rarely –14) mm long, on a pedicel c. 2–3 mm in length, pubescent like the stems, subtended by a small, finally recurved, bract 1–2.5 mm long. Calyx finely pubescent, broadly campanulate with 5 subequal teeth (the upper usually a little shorter and narrower than the lower) and the tube contracted into a short receptacle; tube slightly shorter than the teeth and slightly longer than the receptacle, the whole c. 5 mm long, with a pair of minute bracteoles c. 1 mm or less in length, usually attached near the top of the receptacle. Petals golden yellow without other marking, the standard oval to nearly circular, slightly broader, c. 8–11 mm, than long, c. 7–9 mm, with calli extending onto the claw, the apex shortly retuse, sometimes with a point in the shallow indentation, the wings rounded-oblong to triangular with a curved claw, the keel slightly longer than the wings, rounded, 8–10 (–12) mm long, shortly ciliate along the free upper margins with a short beak often slightly incurved. Ovary more or less hoary or pubescent, with a band of longer hairs along the upper suture, insignificant in the fruit. Pod oblong-clavate, tapered asymmetrically into the stipe, c. 15–30 mm long. Seeds chrome yellow, almost smooth, the radicular lobe prominent but scarcely hooked. Fl. & fr.: after rain, but mostly in Summer and Autumn.

DISTRIBUTION: In New South Wales only in the North Western Slopes and Plains, but extending across tropical Australia from the Hall (formerly Ord) District of Western Australia, through the Northern Territory (chiefly in the Barkly Tableland) and central Queensland to New South Wales (cf. map in Lee, l.c. p. 330).

Two subspecies are recognized, ssp. *dissitiflora* in subtropical and temperature latitudes (mostly in inland Queensland and New South Wales), and ssp. *rugosa* in the tropics from Western Australia to Queensland. One subspecies only is found in New South Wales.

C. dissitiflora ssp. *dissitiflora*; Lee, l.c., p. 331; Jacobs & Pickard, Pl. New South Wales: 119 (1981); Jessop (ed.), Fl. Central Australia: 153 (1981); Cunningham et al., Pl. W. New South Wales: 387 (1981). — *C. dissitiflora* var. *dissitiflora*; Chippendale, Proc. Linn. Soc. New South Wales 96: 239 (1972).

[The references under *C. dissitiflora* in Moore & Betche, l.c., and Maiden & Betche, l.c., apply to this subspecies only.]

Characters of the species, but distinguished from ssp. *rugosa* by a relatively slight pubescence, leaflets sparsely pubescent with short appressed hairs (c. 0.5 mm long) below, glabrous above, and with the upper surface at least (usually the lower also) minutely dotted; and flowers small, usually 8–11 mm long, and rounded (from the curved, not angular, keel, with short and often slightly incurved beak).

DISTRIBUTION: In inland areas of northern New South Wales and southern Queensland (Mitchell, Leichhardt, Gregory South, Warrego, Maranoa and Darling Downs Districts), and also in several isolated localities in the Northern Territory (Central Australia), usually south of the tropic of Capricorn; always on heavy, often black, soils, occasionally when these overlain by sand, or (as in Central Australia) associated with soils of higher pH, those derived from limestones.

NORTH WESTERN SLOPES: Tamworth, *Barnier NSW* 45863, 3.1953. **NORTH WESTERN PLAINS:** 10 km W. of Barrington, *Mills & Cox 211*, 3.1975; Moree-Boggabilla road, *Jackson NSW 115136*, 5.1972; Collarenebri, *Waterhouse NSW 45852*, 9.1950; Moree, *Maciet NSW 113667*, 2.1969; *Cutting NSW 113670*, 2.1961; County Narran, *Beadte* 3.1942 (SYD); Walgett, per *Glenfield Vet. Res. Sta 43/350*, 2.1943; "Omco", Burren Junction, *Mitchell NSW 113663*, 2.1967; "Boolcarrol" [WNW. of Edgeroi], *Breakwell NSW 113662*, 4.1967; 17 miles [27 km] N. of Narrabri, *Walker NSW 116650*, 3.1976; Narrabri district, per *Glenfield Vet. Res. Sta NSW 45851*, 4.1937; Narrabri, *Crogan NSW 48928*, 2.1955.

Many of the earlier records concerning poisoning of stock by *C. dissitiflora* are suspect because of the confusion between this species and *C. eremaea*, once regarded as a part of *C. dissitiflora*. However, in Queensland where the distinction has been recognised for a longer period, there is evidence of toxic properties, not fully understood, in both species [Hurst, Poison Pl. New South Wales: 155 (1942), Chippendale & Murray, Northern Territory Admin., Anim. Industr. Branch, Extens. Article 2 (II): 30 (1958) — the plant illustrated (Fig. 20) is *C. eremaea* ssp. *strehlowii*, but the description could apply to *C. dissitiflora* ssp. *rugosa* — and Everist, Proc. Roy. Soc. Queensland 74: 13 (1964) and Poison. Pl. Australia: 294 (1974)].

5. Crotalaria eremaea F. Muell., Enum. Pl. Collect. A.C. Gregory, in Votes & Proc. New South Wales Legisl. Assembly, 2.v.1859 (Papers relative to Expedition in search of Dr Leichhardt); Lee, Tclopea 1 (5): 333 (1978); Jacobs & Pickard, Pl. New South Wales: 119 (1981); Jessop (ed.), Fl. Central Australia: 153 (1981). — *C. dissitiflora* var. *eremaea* (F. Muell.) Benth., Fl. Austral. 2: 184 (1864); F. Mueller, Fragm. 9: 157 (1875); Moore & Betche, Handb. Fl. New South Wales: 145 (1893); F.M. Bailey, Queensland Fl. 2: 376 (1900); Maiden & Betche, Census New South Wales Pl.: 106 (1916); see also under the subspecies. — **HOLOTYPE:** MEL 1010369 !; see Lee, l.c.

[The binomial *C. eremaea*, its synonym *C. dissitiflora* var. *eremaea*, and even *C. dissitiflora* alone, have been variously used for the whole or part of this species.]

Soft-wooded shrubs, erect to c. 1 m high, with entirely glabrous or variously pubescent parts, the plants often in rather dense communities but some at least of the apparent individuals connected by deeply sited, widely extending, horizontal

roots. Leaves long-petiolate, 1- or 3-foliolate, the lateral leaflets if present often much reduced; stipules minute, less than 1.5 mm long, or apparently absent, very rarely spreading and persistent as in *C. dissitiflora*. Leaflets very variable in shape, oblong, elliptical, ovate, trullate, obovate or (laterals) almost circular, and in pubescence, from glabrous or hoary with short appressed hairs below to densely tomentose on the lower or both surfaces; often rather thick in texture, shown by wrinkling of the surface when pubescence not dense, the terminals often 25–40 mm long, the laterals usually less than 1 cm. Inflorescences of c. 15–30 flowers in terminal racemes, the flowers variable in size and form but rarely less than 1 cm long. Calyx open-campanulate with 5 subequal triangular teeth, the tube of about equal length narrowed into a short receptacle with a pair of small bracteoles inserted at or near the top of the pedicel; pubescence usually present, very sparse to very dense in accordance with the vegetative parts. Petals yellow, the standard nearly circular, often 10–12 mm long and broad, the wings rounded-oblong to triangular with a curved claw, the keel short and rounded to more angular with a longer, straight beak, often 11–12 but up to 18 mm long, slightly longer than the wings. Ovary, pod and seeds as in *C. dissitiflora*. Fl. & fr.: after rain, but mostly in Summer and Autumn.

DISTRIBUTION: Central Australia, extending into the far northwest of New South Wales, and into southwestern Queensland, central and northern South Australia, and the Great Victoria Desert (Giles and Helms Districts) of Western Australia (cf. map in Lee, i.e. p. 330).

C. eremaea falls into two subspecies with marked morphological differences, but different combinations of the diagnostic characters can be seen in numerous atypical or intergrade specimens found chiefly in the zone of contact which runs approximately northwards from Spencer's Gulf (South Australia). Ssp. *eremaea* comprises the eastern, and ssp. *strehlowii* the western, part of the species population. One subspecies only occurs in New South Wales.

C. eremaea ssp. *eremaea*; A. Lee, Telopea 1 (5): 335 (1978); Jacobs & Pickard, Pl. New South Wales: 119 (1981); Jessop (ed.), Fl. Central Australia: 153 (1981); Cunningham et al., Pl. W. New South Wales: 387 (1981).

Pentadynamis incana R. Br., Bot. App. in Sturt, Narr. Exped. Centr. Australia 2: 76 (1849) non *Crotalaria incana* L. — HOLOTYPE: n.v.; see Lee, l.c.

[The references under *C. dissitiflora* var. *eremaea* (syn. of *C. eremaea*) of Moore & Betche, l.c., and Maiden & Betche, l.c., apply to this subspecies only.]

Characters of the species: differs from ssp. *strehlowii* in having leaflets essentially oblong (rather than ovate to trullate), 1 or 3 in the leaf, the laterals if present reduced but sometimes approaching the terminal in form and then up to (rarely more than) half its length; the leaflets densely to sparsely pubescent with appressed to spreading hairs, always with some hairs above and usually these denser below (not glabrous above and sparsely pubescent or glabrous below); the stipules (often obscured by the pubescence) usually minute or absent as in ssp. *strehlowii*, but occasionally up to 4 mm long and spreading, as in *C. dissitiflora*, and the petioles often persisting after the leaflets have fallen.

DISTRIBUTION: In the Far North Western Plains of New South Wales extending south to Menindie, and in neighbouring parts of Queensland and South Australia; also in a few scattered localities in the Northern Territory (Central Australia); almost always on sandy soils but occasionally (around the eastern part of the Simpson Desert) on red and brown loams.

NORTH FAR WESTERN PLAINS: Queensland border, N. and a little W. of Broken Hill, MacGillivray NSW 45874, 4.1917; Fort Grey, Brough & Beadle, 8.1939 (SYD); near Fort Grey, Brough & Beadle, 8.1913 (SYD); "Olive Downs" c. NNW. of Tibooburra, Milthorpe 880, 10.1972; "Waka", e. between Fort Grey and Tibooburra, Milthorpe 882, 10.1972; Sturt National Park, NW. of Tibooburra.

Paijmans 3119, 6.1979; Bindara Tank, "Delalah Downs", *Cunningham* 495, 8.1972; 29° 22' S, 143° 03' E, "Delalah Downs", *Pickard* 2071, 3.1973; "Gumvale", Tibbooburra, *Johncock NSW* 101222, 101223, 4.1967, *Burgess & Beadle*, 2.1950 (SYD); "Yandama", *Collier NSW* 45857, 7.1910; 130 km W. of Wanaaring, *Blaxell* 618, 11.1971; 10 km N. of Hawker Gate on S.A. border, *Pickard* 3161, 11.1976; Milparinka, *Glenfield Vet. Res. Sta.* 6737, 6.1930, *Whalley NSW* 45849, 4.1957, *Beadle* 10.1939 (SYD); "Winnathee", 60 miles [97 km] W. of Milparinka, *Johnson & Constable NSW* 33370, 6.1955 (NSW, K); Clifton Bore, E. of Milparinka, *Blaxell* 416, 4.1970; 7 miles [11 km] SE. of Milparinka, *Salasoo* 5375, 11.1973; 138 miles [222 km] from Broken Hill towards Tibbooburra, *Gittins* 1910, 8.1969 (BRI, NSW); Coally [near Milparinka], *Richtley* 1267, 10.1973; 20 miles [32 km] S. of Milparinka, *Beadle NSW* 113679, 5.1963; Lake Yantara, *Beadle*, 8.1941 (SYD); Silver City Highway close to Salt Lake, *Martensz* 246, 12.1969; "Callindry", *Leigh* W205, 7.1968; Cobham, *MacGillivray per Morris* 669, 8.1921; sandhills, Cobham, *Morris* 784, 10.1921 (BRI); Cobham Lake, *Bünerlen NSW* 45866, 9.1887, *Williams NSW* 45871, 10.1901, *Cunningham* 1070 & *Miltiorpe*, 9.1973; Paldrumatta Bore, *Corbett NSW* 45869, 4.1900; 3.2 km N. of Turleys Gate, S.A.-N.S.W. border, *Campbell & Pickard* 1256, 11.1970; 180 km N. of Broken Hill, *Mulliam W771*, 8.1974; 35 km N. of Broughams Gate, . . . 30° 35' S, 141° 00' E, *Lee* 226, 9.1971; 0.8 km S. of "Tielta" Homestead . . . 30° 50' S, 141° 14' E, *Lee* 216, 9.1971; Barrier Range, *Collins*, 9.1921 (SYD). SOUTH FAR WESTERN PLAINS: Kinchega National Park, Menindee, *Ryan & Everley NSW* 113672, 6.1969.

As in *C. dissitiflora* above, early records of toxic properties in *C. eremaea* are suspect because of confusion between these two species. It is probable, however, that some at least of the records published under "*C. dissitiflora*" q.v., do apply to *C. eremaea*, and that there are toxic properties in this species. Everist, Poison. Pl. Australia: 288 (1974), records fatal results from a feeding test with *C. eremaea* which he correctly distinguishes from *C. dissitiflora*.

6. **Crotalaria pallida* R. Br. in Ait., Hortus Kew. 3: 20 (1789); Candolle, Prodr. 2: 134 (1825); Polhill, Kew Bull. 22: 262 (1968), in Milne-Redhead & Polhill (eds), Fl. Trop. E. Africa (Leguminosae, Papilionoid.): 905 (1971); Jacobs & Pickard, Pl. New South Wales: 119 (1981); see also under the subspecies. — TYPE: n.v. (BM).

[This species was at one time widely misidentified as *C. saltiana* Andr.]

Erect, well-branched, soft-wooded shrubs, annual or perennating for a few years only, from less than 1 to 3 m high, the stems slightly ribbed and hoary with sparse, short, appressed hairs. Leaves trifoliolate, on petioles about equal to the laminæ; stipules absent or obscure, or occasionally up to 3 mm and then caducous. Leaflets elliptical to obovate, often 2.5–5 (–13) cm long, 1–2 (–7) cm broad, glabrous above, hoary or sparsely appressed pubescent below. Inflorescence a raceme, terminal on the stem and on short branches in the upper axils, many-flowered, shortly pedunculate, up to c. 30 cm long, the flowers rather crowded, on appressed-pubescent pedicels of c. 5 mm subtended by linear bracts of equal length (seen only in very young bud stage). Calyx 6–7.5 mm long, pubescent with fine, soft, white hairs as on the pedicel, deflexed and becoming flattened or impressed at the base, the teeth triangular, about equal to the tube, the upper pair joined to the top. Petals yellow, with reddish brown veins especially on the standard, the standard elliptical, longer (c. 11 mm) than broad (8–10 mm), with calli at the claw junction and woolly hairs below them, the wings shorter than the keel, the keel yellowish-green usually with brownish veins, rather narrow, curved in a right angle or with the apex slightly incurved, tapered evenly into the not-twisted beak. Pod rounded-oblong, softly pubescent, 35–45 mm long with numerous seeds. Seeds oblique-cordiform, brown, or mottled yellow and dark grey-green, c. 3.5 mm long. Chromosome number: $2n = 16$ (Boulter et al., New Phytol. 69: 117–131 (1970)). Fl. & fr.: in all seasons, but chiefly from late Autumn to early Spring (in New South Wales).

DISTRIBUTION: Naturalized in Australia. Native in tropical Africa and throughout the tropics, its origin now obscured.

Two varieties are recognized in Africa, of which only one (with some "intergrade" forms) occurs in New South Wales.

C. pallida var. *obovata* (*G. Don*) *Polhill*, Kew Bull. 22 (2): 265 (1968), in Milne-Redhead & Polhill (eds), Fl. Trop. E. Africa (Leguminosae, Papilionoid.): 906 (1971); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — *C. obovata* G. Don (basionym), Gen. Hist. Dichl. Pl. 2: 138 (1832); E.G. Baker, J. Linn. Soc., Bot., 42: 345 (1914). — TYPE: n.v. (BM). — EXAMPLES: Grafton District, per Glenfield Vet. Res. Stn NSW 45933, 3.1942; Grafton Experiment Farm, Wilson NSW 113698, 5.1955.

C. falcata DC., Prodr. 2: 132 (1825); E.G. Baker, l.c.: 344; Wilczek, Fl. Congo Belge 4: 169 (1953). — TYPE: n.v. (G).

[*C. mucronata* Desv., J. Bot. Agric. 3: 76 (1814), is a synonym of var. *pallida* only, according to Polhill, l.c. (1968: 262), but this name was used for Australian plants, which belong to var *obovata*, by L.S. Smith, unpubl. Key to *Crotalaria*, at BRI (1961), and also by Backer, Fl. Java 1: 584 (1963) for plants in that area.]

[*C. striata* DC., Prodr. 2: 131 (1825), is a synonym of var. *pallida* only, according to Polhill, l.c., but this name was used for Australian plants (var. *obovata*) by F. Mueller, Second Syst. Census: 66 (1889); F.M. Bailey, Cat. Pl. Queensland: 12 (1890); F.M. Bailey, Queensland Fl. 2: 376 (1900) and Ewart & Davies, Fl. Northern Territory: 141 (1917).]

Characters of the species: differs from var. *pallida* in size and shape of the leaflets, the leaflets obovate-elliptical to obovate rather than elliptical, broadest in the distal one-third, rather than at the middle, often 2.5–5 cm long and 1–2 cm broad in Australian plants, the apex rounded to retuse rather than acute to rounded. Chromosome number [as *C. obovata*]: $2n = 16$ (Hagerup in Darlington & Wylie, Chromosome Atlas of Flowering Plants, edn 2 (1955)).

DISTRIBUTION: Naturalized in the upper North Coast of New South Wales, and in coastal Queensland, as well as in many tropical regions; origin now obscure, but showing greatest development in the Old World.

NORTH COAST: near Murwillumbah, Braithwaite NSW 113696, 9.1963; Brunswick Heads, O'Hara & Coveny 3477, 2.1971; Grafton, per Glenfield Vet. Res. Stn NSW 45933, 2.1934; Grafton district, per Glenfield Vet. Res. Stn NSW 45933, 3.1942; Grafton Experiment Farm, Wilson NSW 113698, 5.1955; Glenugie Peak, c. 12 miles [19 km] SE. of Grafton, Constable 6413, 9.1965; Glenugie State Forest at base of Glenugie Peak (Mt Elaine), Pickard & Blaxell 236, 4.1969; lower slopes of Glenugie Peak, Floyd 1247, 6.1979; Macksville, Cripps NSW 117344, 6.1978.

This taxon has proved toxic to several different animals in feeding tests with freshly cut material, but the plants appear to be unpalatable to stock and also to lose their toxicity if not consumed within a few hours. The alkaloid monocrotaline is believed to be the poisonous principle [see Poison Pl. Committee, CSIR, Pam. 49: 28 (1934), Hurst, Poison Pl. New South Wales: 159 (1942), and Webb, CSIR Bull. 232: 82 (1948), as *C. striata*; Everist, Proc. Roy. Soc. Queensland 74: 13 (1964) and Watt & Breyer-Brandwijk, Med. Poison. Pl. S.E. Africa edn 2: 579, 586, 589 (1962), as *C. mucronata*; and Everist, Poison Pl. Australia: 285 (1974), as *C. pallida*]. It has been introduced (as *C. striata*) for agricultural trials in the North Coast of New South Wales, and is mentioned under this name as a source of green manure by Uphof, Dict. Econ. Pl., edn 2: 159 (1968).

7. **Crotalaria lanceolata* E. Mey., Comment. Pl. Africæ Austral.: 24 (1836); Polhill, Kew Bull. 22: 268 (1968), in Milne-Redhead & Polhill (eds) Fl. Trop. E. Africa (Leguminosae, Papilionoid.): 913 (1971); Jacobs & Pickard, Pl.

New South Wales: 119 (1981). — TYPE: n.v. (K). — EXAMPLE: Northey Road, Tolga, [Queensland-Cook], McKee 9391, 4.1962 (NSW).

An erect but little-branched, soft-wooded annual to about 170 cm in height (often 30–40 cm in New South Wales), the stems finely ribbed and with a rather sparse pubescence of short, appressed (rarely spreading) hairs. Leaves trifoliolate (in Africa sometimes with one or two leaflets only in upper parts of the plant), on petioles about equal to the leaflets, apparently exstipulate, rather light green in colour but at least sometimes paler below when fresh. Leaflets linear, narrow-elliptical or narrow-ovate, or rarely obtuse and obovate in a few of the lower leaves, the terminal leaflets (12–) 30–40 (–90) mm long, 3–9 mm broad (larger in the tropics), usually glabrous above and with a sparse pubescence like that of the stems below. Inflorescence a raceme, the racemes many-flowered, terminal and sometimes also in the upper axils, 8–30 (–35) cm long including the peduncle which is a little shorter than the rachis, the flowers rather small, 7–9 mm long, on slender pedicels 4–6 mm long ascending against the axis; bracts subulate, usually 1–3 mm long, their expanded bases recurved, their tips again upcurved. Calyx broadly campanulate, becoming flattened at the base, 3–4 mm long, with triangular, acuminate teeth about as long as the tube, sparsely pubescent with hairs like those on the stems, the bracteoles inserted at the base of the calyx, the receptacle obscure. Petals yellow with strong purplish brown venation and often a dark patch near the base, the standard with a rather prominent claw of c. 3.5 mm bearing the limb above the calyx, glabrous except for some woolly hairs near the base of the claw, the limb broad-elliptical or nearly circular, about equal to the claw or slightly longer, the wings shorter or longer than the keel, the keel evenly curved upwards and sometimes slightly inwards from near the middle, rather shallow, 6–7 mm long. Pod sessile, attached by a short and rather thick stipe level with the lower edge, the tip upturned, blackish at maturity, mostly 20–30 mm (–40 mm in tropics) long and 4–5 (–6) mm in diameter, with numerous (24–60) small oblique-cordiform seeds. Seeds about 2–3 mm long, pale yellow to reddish when mature and fertile. Chromosome number: $2n = 16$ (Boulter et al., New Phytol. 69: 117–131 (1970)). Fl. & fr.: chiefly in Autumn.

DISTRIBUTION: Naturalized in Australia (Queensland and New South Wales). Native in eastern Africa from southern Ethiopia to northeastern South Africa.

Three subspecies are recognized in Africa, one is present in New South Wales though an imperfect specimen may represent another, ssp. *contigua*.

C. lanceolata ssp. *lanceolata*; Polhill, I.c. (1968) p. 269, (1971) p. 914; Jacobs & Pickard, Pl. New South Wales: 119 (1981).

This subspecies is distinguished by its keel which has a shallow curve and short beak (mostly 4–5 mm long) and is exceeded by the wings.

DISTRIBUTION: Naturalized in the North Coast of New South Wales, and along the coast and coastal ranges of Queensland; in Africa this subspecies has the most coastal distribution and extends farthest south.

NORTH COAST: Stotts Creek via Murwillumbah, Brinsmead NSW 117347, 4.1973; Lismore District, Eggins NSW 113704, 3.1967; 4.5 km N. of Wardell, Coveny 5120, 9.1973; Grafton Experiment Farm, Wilson NSW 113708, 5.1955; Rhones Ck via Macksville, Welsh NSW 117345, 2.1978; Missabotti via Bowraville, Moran NSW 113705, 4.1970; Rollands Plains, c. 18 miles [29 km] NW. of Port Macquarie, Fox NSW 114051, 2.1971; Taree, Noonan NSW 113707, 6.1964. CENTRAL COAST: Dural, Stuckey NSW 113706, 3.1965.

This taxon has been introduced to New South Wales as a potentially useful pasture legume for the North Coast, and has also appeared as an impurity in other tropical legume seeds in trial plots there. There are no records of toxicity associated with it.

8. **Crotalaria zanzibarica* Benth., London J. Bot. 2: 584 (1843); Polhill, Kew Bull. 22: 193 (1968), in Milne-Redhead & Polhill (eds), Fl. Trop. E. Africa (Leguminosae, Papilionoid.): 911, fig. 126 (1971); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — TYPE: n.v. (K). — EXAMPLE: Botanic Gardens Sydney (cult.), Green NSW 9223, 4.1949.

C. usaramoensis E.G. Baker, J. Linn. Soc., Bot. 42: 346 (1914); L.S. Smith, unpubl. Key to *Crotalaria*, at BRI: 4 (1961); Backer, Fl. Java 1: 584 (1963). — TYPE: n.v. (B, destroyed; BM fragm.). — EXAMPLE: Moshi District, Tanganyika, C.R.S. Lyamunga, Wallace 1007, 9.1941 (NSW).

An erect, soft-wooded shrub, annual or sometimes persisting for a few years, 30–270 cm tall with more or less spreading branches, the stems rather obscurely and shallowly ribbed and appressed-pubescent with short pale hairs. Leaves trifoliolate, on petioles about equal to or a little shorter than the leaflets, exstipulate. Leaflets elliptical, acute, acuminate or occasionally somewhat rounded at the apex, 3–5 (–10.5) cm long, 8–20 (–40) mm broad, glabrous or with a few hairs along the midrib above, sparsely appressed-pubescent to almost hoary below. Inflorescence a terminal, many-flowered raceme, the peduncle usually much shorter than the rachis, the whole often c. 30–40 cm long; flowers mostly 12–15 mm long but rather deep due to the curvature of the keel, on an appressed-pubescent pedicel c. 8 mm long, subtended by persistent linear bracts c. 2–3 mm long. Calyx 4–6 mm long, becoming flattened against or even partly retracted around the pedicel, glabrous or with a short, fine, appressed indumentum, the teeth narrow-triangular, shorter than the tube; bracteoles usually inserted near the top of the pedicel or sometimes just below the receptacle or on the base of the calyx. Petals yellow with purplish brown markings, the standard yellow with purplish veins, broadly elliptical to nearly circular, acute at the apex, glabrous except for dense woolly hairs on the claw and spreading onto the two calli at the junction of claw and limb, c. 8–10 mm long on a claw of 3 mm, the wings about equal to the keel, the blade more or less oblong, with some woolly hairs on the auricle and usually a dark purplish patch near the junction of claw and limb, the veins less strongly coloured than in the standard, the keel rounded at about the middle, often considerably incurved so that the beak is almost equal to overall keel length, rather narrow, often 12–15 mm long, 4–5 mm broad, the sharp, not twisted beak c. 10–12 mm long. Pod more or less oblong-cylindrical, often 3.5–4.5 cm long and 7–11 mm in diameter, pubescent with pale, softly appressed hairs and becoming black at maturity, on a stipe included within the calyx and continuous with the lower edge of the pod. Seeds oblique-cordiform, c. 2–3 mm long, smooth, pale yellow to reddish when mature and fertile. Chromosome number (as *C. usaramoensis*): $2n = 16$ (Kawakami in Darlington & Wylie, Chromosome Atlas of Flowering Plants, edn 2 (1955)). Fl. & fr.: mostly in Autumn and Winter.

DISTRIBUTION: Cultivated in Australia, escaped from cultivation and naturalized in the North Coast of New South Wales and along the Queensland coast. Native in tropical Africa.

NORTH COAST: Murwillumbah, Budd NSW 113946, 6.1970, Mant NSW 114076, 4.1971; Grafton District, per Glenfield Vet. Res. Stn. NSW 113699, 7.1941; Grafton Experiment Farm, Hartridge NSW 113700, 12.1952, Wilson NSW 45926, 5.1955.

There are no records of toxicity for this species. It is mentioned (as *C. usaramoensis*) as a green manure source by Uphof, Dict. Econ. Pl., edn 2: 160 (1968).

9. *Crotalaria juncea* L., Sp. Pl.: 714 (1753); Candolle, Prodr. 2: 126 (1825); F. Mueller, Fragm. 3: 51 (1862), 9: 156 (1875), Syst. Arrangement Carpenterian Pl., App. in Laurie (ed.), Landsborough's Explor. Australia: 114 (1863); Bentham,

Fl. Austral. 2: 179 (1864); J.G. Baker in J.D. Hooker, Fl. Brit. India 2: 79 (1876); F.M. Bailey, Syn. Queensland Fl.: 97 (1883); Maiden, Useful Native Pl. Australia: 620 (1889); F.M. Bailey, Queensland Fl. 2: 378 (1900); Maiden & Betche, Census New South Wales Pl.: 106 (1916); Ewart & Davies, Fl. Northern Territory: 141 (1917); Domin, Biblioth. Bot. 22 (89²): 731 (1925); Gardner, Enum. Pl. Austral. Occid.: 62 (1930); Backer, Fl. Java 1: 582 (1963); Kaur, Bull. Lucknow Natl. Bot. Gard. 87: Pls 2, 3 (1964); Beard (ed.), Descriptive Cat. W. Austral. Pl.: 45 (1965), edn 2: 65 (1970); Polhill, Kew Bull. 22: 196, 301 (1968), in Milne-Redhead & Polhill (eds), Fl. Trop. E. Africa (Leguminosae, Papilionoid.): 950 (1971); Chippendale, Proc. Linn. Soc. New South Wales 96: 239 (1972); Jacobs & Pickard, Pl. New South Wales: 119 (1981); Jessop (ed.), Fl. Central Australia: 155 (1981). — TYPE: n.v. (BM). — EXAMPLE: Rockhampton [Queensland—Port Curtis], A. Dietrich 2175, 1864–66 (NSW, ex HBG).

Synonyms for this name have not been in use in Australia; for synonymy see Domin, l.c., Polhill, l.c. (1971).

An erect, somewhat stiff and slender, soft-wooded shrub about 1–2 m tall, the ribbed stems rather densely appressed-pubescent with pale to brownish, shining hairs. Leaves simple, exstipulate, linear to narrow-oblong, shortly acute and apiculate at the apex and tapering at the base into a short petiole 2–3 (–5) mm long, clothed sparsely above and more or less densely below and on the petioles with hairs like those on the stems, the lamina about 3–5 (–13) cm long, 2–8 (–22) mm broad. Inflorescence a terminal raceme, or raeemes sometimes also in the upper axils, with about 10–20 flowers, the peduncle very short, the whole c. 15–30 cm long; the flowers 13–14 mm long, subtended by persistent, acuminate, narrow-elliptical or -ovate, rather densely pubescent bracts 2–5 mm long, the curved-spreading pedicel c. 5 mm long. Calyx enclosing the buds, and almost as long as the corolla, rather obscurely 2-lipped, 11–15 (–20) mm long, densely clothed with ascending, shining hairs of 2 lengths, at first silvery, finally brown; teeth much longer than the tube, narrow-triangular, the three lowest tending to cohere at their tips, the tube narrowing abruptly into a rather broad, ribbed receptacle at the base. Petals yellow, the standard broad-elliptical to nearly circular, bright yellow at first, drying pale, often with a faint purplish flush in the upper part and usually with a sparse pubescence outside in the central upper part, the wings shorter than the keel, the keel abruptly rounded at about one-quarter to one-third of its length from the base, the separate lower margins of the curve narrowly and shortly bearded, 12–13 (–17) mm long, 5–6 mm broad, the beak long-attenuate and twisted sometimes through several turns, c. 10 mm long. Pod oblong-cylindrical, 25–40 (–55) mm long, 7–11 (–17) mm diam., densely tomentose with spreading hairs, c. 10-seeded, on a very short stipe enclosed in the calyx tube. Seeds 3–4 (–6) mm long, oblique-cordiform with the narrow lobe strongly incurved, smooth and shining except for shallow pitting chiefly around the hilum, very dark to black when mature. Chromosome number: $2n = 16$ (Datta & Ganguly, Broteria 36: 39–46 (1967)). Fl. & fr.: Autumn and Winter.

DISTRIBUTION: The single collection from New South Wales in 1910 suggest that an attempt made to establish it here failed. It certainly does not appear to be part of the naturalized flora of the State today. The species is native from India through Malesia to tropical Australia but cultivated and often naturalized throughout the tropics.

NORTII COAST: Gordon Brook, Upper Copmanhurst, Rupp NSW 45705, 7.1910.

There are a number of records of toxicity for this species, the seed of which is said to contain HCN, and alkaloids are reported in the plant (Watt & Breyer-Brandwijk, Med. Poison. Pl. S.E. Africa edn 2: 579, 586, 1142 (1962); Webb, CSIR Bull. 232: 81 (1948); Everist, Proc. Roy. Soc. Queensland 74: 13 (1964), Poison.

Pl. Australia: 295 (1974); and Chippendale & Murray, Northern Territory Admin., Anim. Industr. Branch Extens. Article 2 (II): 34, Fig. 21 (1958)). Nevertheless, a limited feeding test was negative and in India the species has been used in feeding milch cows. It is also the source of the fibre Sun(n) Hemp [see Uphoff, Diet. Econ. Pl. edn 2: 159 (1968)].

10. *Crotalaria montana* Roth, Nov. Pl. Sp.: 335 (1821); Verdecourt, Manual New Guinea Legumes: 581 (1979). — TYPE: n.v. — EXAMPLE: Middle Perey l., 87 miles [140 km] SE. of Maekay [Queensland: Port Curtis], Lazarides 5619, 4.1956 (NSW).

C. brevis Domin, i.e. — TYPE: n.v.; identification ex deser.

C. exserta Domin, i.e. — TYPE: n.v.; identification ex deser.

[*C. linifolia* misappl., non L.f.: F. Mueller, Fragm. 3: 55 (1862); Bentham, Fl. Austral. 2: 180 (1864); F. Mueller, Fragm. 9: 156 (1875); F.M. Bailey, Syn. Queensland Fl.: 97 (1883); Tate, Handb. Fl. Extratrop. South Australia: 66, 223 (1890); Moore & Betche, Handb. Fl. New South Wales: 145 (1893); F.M. Bailey, Queensland Fl. 2: 373 (1900); Maiden & Betche, Census New South Wales Pl.: 106 (1916); Ewart & Davies, Fl. Northern Territory: 141 (1917); Domin, Biblioth. Bot. 22 (89²): 732 (1925); Gardner, Enum. Pl. Austral. Oceid.: 62 (1930); L.S. Smith, unpubl. Key to *Crotalaria*, at BRI: 2 (1961); Beard (ed.), Descriptive Cat. W. Austral. Pl. edn 2: 65 (1970); Chippendale, Proc. Linn. Soc. New South Wales 96: 239 (1972); Beadle, Stud. Fl. N.E. New South Wales 3: 395, Fig. 176 B2 (1976); Jacobs & Pickard, Pl. New South Wales: 119 (1981). Verdecourt, i.e., states: 'The type of *C. linifolia* L.f. is undoubtedly a specimen of the species usually called *C. tecta* Roth.'.]

Very variable in habit, from prostrate or erect herb-like plants, through decumbent forms to taller (c. 1 m) and erect, soft-wooded shrubs, the stems single to many-branched, at least sometimes with extensive or congested rhizomes indicative of the perennial condition. Vegetative parts variously clothed with closely to loosely appressed hairs, often closely appressed and rather coarse, shining and stiff, sometimes longer, more lax, finer and less glossy (as in those described as *C. brevis* Domin), probably all whitish at first, then more or less ferruginous, a few minutely tubercle-based. Leaves simple, on a very short petiole of c. 1 mm, without stipules, the lamina usually rounded-oblong or elliptical, three to nearly thirty times as long as broad, obtuse, rarely more tapered at the base, less commonly (perhaps often in northern Australia) linear, (10-) 25-40 (-70) mm long, (1.5-) 2-6 (-10) mm broad, variously pubescent but more densely below than above, with hairs like those on the stems, to nearly glabrous. Inflorescence a raceme, terminal and occasionally also in a few upper axils, from almost capitate to c. 30 cm long including the short peduncle of up to 2.5 cm; flowers (6-) 7-8 (-10) mm long, subtended by small linear bracts of 1-2 mm, pubescent like the stems and calyx, at first ascending or occasionally somewhat spreading, to reflexed or incurved at fruiting. Calyx more or less funnel-shaped, with a moderately dense pubescence like that of the stems, two lobes broader and joined nearly to the top in an upper lip, three narrow-triangular, free to their base but with tips often cohering, in a lower lip; calyx lobes 4-6 (-7) mm long, greatly exceeding the tube of 1 mm and the insignificant receptacle of less than 1 mm, the bracteoles inserted on the tube but often decurrent on tube and receptacle, up to 5 mm long, linear and with a pubescence like that of the stems and calyx. Petals pale yellow, the standard broadly ovate, more or less acute at the apex, almost equal in length and breadth, 4-6 (-7) mm and 3-5 mm respectively, on a short, relatively broad claw, the wings slightly shorter than the keel, the keel with a narrow and distinctly twisted beak,

5–7 (–8) mm long, 2–3 mm broad, the beak 4–6 (–7) mm long. Ovary glabrous, the style geniculate and constricted within the keel. Pod oblong-ellipsoid, from almost entirely enclosed in, to twice as long as, the calyx, 6–7 (–11) mm long, usually dark grey to blackish at maturity with several, often 6–12, seeds, but perhaps pale greenish in long-fruited forms more common in northern Australia and described as *C. exserta* Domin. Seeds oblique-cordiform, dark brownish black to greenish ochre, with a pale area around the hilum, about 1.5 mm long and broad, the surface glossy, almost smooth, the radicular lobe not strongly hooked. Chromosome number: $2n = 16$ (Bir & Kumari, Taxon 27: 60 (1978), as *C. linifolia*). Fl. & fr.: at any time except Spring; chiefly Jan.–May.

DISTRIBUTION: In the North Coast of New South Wales, but chiefly in the Darwin and Gulf District of the Northern Territory and in coastal and subcoastal areas of Queensland; also recorded for Western Australia. Native also in India, Malesia, China and the Philippines.

NORTH COAST: Tweed R., ?*Betche* NSW 45712; Kyogle to Woodenbong, c. 1 mile [1.6 km] NW. of Grevillia, *Salasoo* 4574, 1.1971; N. arm of Brunswick R. c. 3 miles [5 km] N. of Brunswick Heads, *Constable* 6517, 11.1965; Cape Byron, *Betche* NSW 45722, 4.1896; c. 1 mile [1.6 km] E. of Cawonga, *Salasoo* 4564, 1.1971; Ruthven via Lismore, *Murray* NSW 45735, 5.1924; Tabulam to Drake, *Maiden* & *Boorman* NSW 45714, 12.1903; Greenridge, *McAuliffe* NSW 45731, 11.1907; Mt Sugarloaf, 11 miles [17.6 km] SW. of Wyan, *Clarke*, *Pickard* & *Coveny* 1830, 7.1969; Tabulam to Grafton road, 7 miles [11 km] S. of Baryulgul, *Blaxell* 340, 4.1969; Yamba, *Heywood* NSW 113723, 1.1959; junction of Coaldale road and Fortis Creek fire trail, *Tindale* 2008 & *Wilson*, 2.1973; Cangai (N)W. of Grafton, *Brooke* NSW 113726, 2.1963; Jackadgery, *Coveny* 1921, 8.1969; Clarence R., *Thompson* NSW 45729, 1.1901; Copmanhurst, Clarence R., *Boorman* NSW 45733, 5.1916; Copmanhurst, *Ripp* NSW 45732, 5.1909; Ramiorne, 3 miles [5 km] NW. sic [S.] of Copmanhurst, *Blakely* & *Shires* NSW 45734, 7.1922; S. of Woolgooga Beach to N. of Esmeralda Beach, *Whaite* 3469, 1.1971; Coffs Harbour, *Boorman* NSW 45725, 5.1909; 1–2 miles [1.5–3 km] E. of Thora, *Salason* 1943, 1.1960; Georges Crk, *Boorman* NSW 45728, 1.1907; Hat Head Mtn, Korogoro Point, *Constable* NSW 45719, 1.1953; Port Macquarie, *Brown* NSW 45715, 12.1897; Gloucester Buckets c. 1.5 miles [2 km] W. of Gloucester, *Coveny* NSW 131123, 1.1966. NORTHERN TABLELANDS: Mt Lindesay, *Boorman* NSW 45723, 3.1916. NORTH WESTERN SLOPES: Warialda, *Williams* NSW 116280, 7.1973.

A single record of suspected toxicity (as cause of "walkabout disease") in this species is cited under *C. linifolia* by Everist, Poison. Pl. Australia: 295 (1974).

11. **Crotalaria semperflorens* Vent., Descript. Pl. Nouv. Jard. Cels : t. 17 (1800); Candolle, Prodr. 2: 125 (1825); J.G. Baker in J.D. Hooker, Fl. Brit. India 2: 78 (1876); Backer, Fl. Java 1: 581 (1963); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — TYPE: n.v.; identification from descriptions and illustrations only.

Synonyms of this name have not been in use in Australia; for synonymy see Baker, i.e.

A tall, open, perennial shrub or small tree, cultivated as a garden ornamental and sometimes escaped, to 4–5 m, the stems terete but slightly ridged, with a dense clothing of more or less long, crinkled, spreading, pale, fine hairs, then glabrescent. Leaves simple, large, soft, ovate or elliptical, glabrous above, paler below with a greyish pubescence of loosely appressed, fine white hairs at first quite dense then more sparse, the margins entire but from minute undulations appearing obscurely denticulate in some dried specimens, the apex acute and usually with a fine subulate tip, the petioles usually 1–2 cm long with a pair of foliaceous, semilunate, usually subulate-tipped stipules at their base. Inflorescence a "raceme" with flowers opening sometimes in irregular order, terminal and in the upper axils, about 15 cm long (including the short peduncle) in Australia, ~45 cm in the tropics; flowers 2.5–3 cm long, pedicellate (c. 1.5 cm), in the axils of persistent, narrow-ovate, subulate-tipped bracts c. 7 mm long and 1–3 mm broad, the pedicel and finally recurved bract with the pubescence of stem and leaf respectively. Calyx with five nearly equal, narrow-triangular, subulate teeth of 1–1.5 em, the teeth about twice

as long as the tube contracted at the base into a small receptacle 1–2 mm long, the whole calyx rather densely clothed with a pubescence like that of the stems or of darker hairs, and the two adaxial teeth sometimes cohering irregularly, especially at their tips; bracteoles narrow, acuminate, mostly 2–4 mm long, 1–2 mm broad, pubescent like the bracts, inserted usually just below the receptacle, or occasionally on the pedicel above the middle. *Petals* golden yellow, the standard broadly ovate-elliptical, usually longer than broad, obtuse or sometimes with a very small, more or less recurved point, c. 3 cm long, 2.5 cm broad, red-striate when fresh but fading, woolly at the top of the rather broad claw 3–4 mm long, the wings more or less oblong, a little shorter than the standard, longer than the keel, the keel with a narrow, twisted beak, curved erect at the middle, c. 2 cm long, 1 cm broad, the beak c. 1.5 cm. *Ovary* densely tomentose all over, to sparsely downy only in patches on the side. *Pod* large and inflated, mostly 5–7 cm long including the stipe of 7–10 mm exposed by the recurved calyx, 1.5–2 cm diam. *Seeds* large, glossy, minutely papillose, 6 mm x 4.5 mm, with a hooked radicular lobe. Fl. & fr.: chiefly in Winter–Spring.

DISTRIBUTION: Cultivated in Australia as a garden ornamental and sometimes escaping; in New South Wales chiefly in gardens of the North and Central Coast, with a few escapes rather than fully naturalized populations. These representatives appear to be of the typical form, though a specimen determined as var. *walkeri* (Arn.) J.G. Baker was at one time cultivated in the Royal Botanic Gardens, Sydney. Native in India and Malesia.

NORTH COAST: Salamander Bay, SW. of Nelson Bay, *McGillivray* f276, 8.1965; Belmont, *Wesche* NSW 116453, 4.1972. CENTRAL COAST: Pacific Highway, Central Mangrove, at the Kulnura road junction, *Coveny* 5844, *Hind & Hancock*, 11.1974; Beacon Hill, *Blavett* NSW 113728, 7.1969.

No records of toxicity in this species have been found.

12. *Crotalaria mitchellii* Benth. in Mitchell, Trop. Australia: 122 (1848); F. Mueller, Essay Pl. Collect. Fitzalan Smith's Exped. Estuary Burdekin: 10 (1860); Bentham, Fl. Austral. 2: 181 (1864); F. Mueller, Syst. Arrangement Carpenterian Pl., App. in Laurie (ed.) Landsborough's Explor. Australia: 114 (1863); F.M. Bailey, Syn. Queensland Fl.: 97 (1883); Moore & Betche, Handb. Fl. New South Wales: 145 (1893); F.M. Bailey, Queensland Fl. 2: 374 (1900); Maiden & Betche, Census New South Wales Pl.: 106 (1916); Domin, Biblioth. Bot. 22 (89²): 722 (1925); Beadle, Stud. Fl. N.E. New South Wales 3: 395 (1976); Lee, Telopea 1 (5): 340 (1978); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — HOLOTYPE: n.v. (K), photo (NSW !). — EXAMPLES: Tooroka, Upper Macleay R., *Noonan* NSW 45975, 3.1964; Chinchilla, Queensland, *Darnell-Smith* NSW 45980, 4.1926.

[The name *C. mitchellii* was misapplied to *C. novae-hollandiae* by Mueller, Fragm. 3: 50 (1862), and to *C. smithiana* q.v. by Tate, Black, Chippendale & Murray, Poison Plants Committee CSIR, and Beard.]

Soft-wooded shrubs often about 1 m in height with glabrous or pubescent stems, the hairs rather short and ascending. Leaves simple, often elliptical or narrow-elliptical, glabrous and obscurely dotted above or sometimes on both sides or variously pubescent below, shortly petiolate to almost sessile with scarcely more than the pulvinus, with subulate to setaceous stipules often fallen from herbarium specimens; hairs of the pubescence very short to c. 1 mm long. Inflorescence a terminal or leaf-opposed raceme with numerous, crowded flowers; usually 8–15 (–20) cm long, the flowers 7–11 mm long, on a slender pedicel 1–3 mm long, and subtended by a small narrow bract (1.5–) 2–3 (–4.5) mm long. Calyx with teeth subequal, (2–) 2.5 (–5) mm long, longer than the tube of (1.5–) 2 (–3) mm and slightly protracted on the lower side; receptacle small, 1 mm long. Petals deep yellow, the standard more or less circular but often slightly broader, (5–) 9 (–11) mm, than long, (5–) 6–7 (–9) mm, with a pair of plate-like calli or linear

convergent thickenings above the short claw, the wings shorter than the keel, the keel with a rounded right-angled bend about the middle, (6-) 7-10 (-13) mm long, 3-4 (-5) mm broad, the beak (4.5-) 6 (-8) mm long, twisted at the apex. Ovary almost sessile, the style geniculate but scarcely constricted at the bend. Pod oblong-clavate, tapered to the base, mostly 2-3 cm long, (6-) 8 (-10) mm diam., the stipe elongating to equal the calyx tube. Seeds 8-12 in the pod, slightly flattened, somewhat glossy, greenish grey, c. 4 mm x 3 mm, with a hooked radicular lobe.

DISTRIBUTION: In the northern subdivisions of Coast, Tablelands and Western Slopes of New South Wales, and in coastal and southeastern Queensland (cf. map in Lee, i.c. p. 342).

There are numerous but conflicting records concerning poisonous properties in this species. Everist, Poison Pl. Australia: 295 (1974), concludes from these that there is no definite evidence of toxicity. The plant is not readily eaten by stock. Confusion of identity in the past must be considered as at least partly responsible for misinterpretation of evidence, but there is still some circumstantial evidence of toxicity [see Hurst, Poison Pl. New South Wales: 156 (1942), and Webb, CSIR Bull. 232: 82 (1948)].

Two subspecies are recognized, one coastal in the northern and northeastern parts of the specific range, the other further south, often on the inland slopes of the Great Dividing Range in southern Queensland and northern New South Wales, overlapping and with considerable intergradation in southeastern Queensland.

1. Stems pubescent, very rarely glabrescent; leaves large, often 5-8 cm long, usually elliptical, rounded-acute or acuminate at the apex, pubescent below with irregularly directed, curved hairs often to 1 mm long; flowers in a very dense raceme, the peduncle and rachis often stout..... ssp. *mitchellii* a.
- 1.* Stems glabrous or hoary, occasionally short-pubescent; leaves relatively small, often 4-6 cm long, usually narrow-elliptical or narrow-obovate, retuse or obtuse at the apex, glabrous, hoary or with short hairs below; flowers often more widely spaced and on a more slender peduncle than those of ssp. *mitchellii* ssp. *laevis* b.

a. *C. mitchellii* ssp. *mitchellii*; Lec, i.c. p. 341; Jacobs & Pickard, Pl. New South Wales: 119 (1981).

Diagnostic characters as in the key. Plants 0.3-1 (-1.3) m in height. Leaves grading in size and pubescence towards ssp. *laevis*, (4-) 5-8 (-14) cm long, (1.5-) 3-3.5 (-5) cm broad, the apex usually acute but often a few leaves obtuse to slightly retuse, the stipules 2-5 mm long. Racemes usually less than 20 cm long, on a rather thick peduncle up to 8 mm diam., often with more than 40 crowded flowers. Fl.: most seasons, chiefly Feb.-May. Fr.: mostly Mar.-Aug.

DISTRIBUTION: From tropical Queensland [Cook] to the North Coast of New South Wales; chiefly in coastal and adjacent tableland areas, often on sandy soils near watercourses.

NORTH COAST: Tweed Heads, *Forsyth NSW* 45986, 10.1898; Tooloom Scrub, 15 miles [24 km] SW. of Urbenville, *Constable* 6648, 12.1965; Kyogle, *Vane NSW* 113906, 3.1961; Jackadgery, W. of Grafton, *Brooks NSW* 113905, 2.1963; Grafton, *Glenfield Vet. Res. Stn NSW* 45996, 12.1943; Willawarrin, Upper Macleay R., *Noonan NSW* 113904, 3.1964; Tooroka, Upper Macleay R., *Noonan NSW* 45975, 4.1958; Port Macquarie, *Brown NSW* 45988, 12.1897; Kendall, *Bailey* 86, 9.1929; Craven State Forest [c. 13 km S. of Gloucester], *de Beuzeville NSW* 45989, 7.1917. NORTH WESTERN SLOPES: Gulf Creek road, 13 miles [21 km] from Bingara-Barraba road, *Wilson NSW* 117347, 2.1977.

b. *C. mitchellii* ssp. *laevis* A. Lee, Telopea 1(5): 343 (1978); Jacobs & Pickard, Pl. New South Wales: 119 (1981); Cunningham et al - Pl. W New South Wales: 388 (1981). — HOLOTYPE: *P. Hodge NSW* 84861 Lee, i.c.

Diagnostic characters as in the key. Plants often c. 0.6 m high. Leaves grading in size and pubescence towards ssp. *mitchellii*, (3-) 5-6.5 (-8) cm long, (0.8-) 1.5 (-2.8) cm broad, the apex more or less retuse or at least obtuse, the

stipules 1.5–3 mm long. Racemes similar in length to those of ssp. *mitchellii* but often with less than 30, thus less crowded, flowers, and a more slender peduncle. Fl.: all seasons, chiefly Nov.–Feb. Fr.: mostly Feb.–June.

DISTRIBUTION: In the North Coast, Northern Tablelands and North Western Slopes of New South Wales, and in the adjacent Maranoa and Moreton Districts of Queensland; a somewhat weedy plant, often on sandy or granitic soils.

NORTII COAST: Gloucester, *Betche* NSW 45990, 1.1881, *Heron* NSW 45991, 12.1909; Glendon and Singleton, Hunter R., *Leichhardt* NSW 45959 in mixture, 12.1842–1.1843; Belford, Branxton district, *Brown* NSW 45994, 1.1954. NORTHERN TABLELANDS: Mt Lindesay, *Rupp* NSW 45960, 4.1914; Boonoo Boonoo, *Boorman* NSW 45972, 2.1905; track to Bald Rock Mtn, 1.5 miles [24 km] N. of Tenterfield, *Constable* 2078, 3.1962; Tenterfield to Sandy Flat, *Maiden* NSW 45967, 12.1898; Deepwater, *Fraser & Vickery*, 1.1936 (SYD); Head of Gwydir R., *Leichhardt* NSW 45959 in mixture, probably 3–6.1843; first Moonbi hill, *Martin*, 11.1967 (SYD; Pollen Sample 1388). NORTH WESTERN SLOPES: Wallangra, *Boorman* NSW 45969, 11.1912; Wariadla, *Rupp* NSW 45974, 1.1907; "Terry Hie Hie", *Inspector of Stock* NSW 45962, 12.1910; Pilliga Scrub, *Rolls* 56, 2.1974; Dead Mans Waterhole, Pilliga Scrub, *de Beuzeville* NSW 45966, 11.1915; Coonabarabran to Narrabri road, *Althofer* NSW 114108, 2.1971; 1 mile [1.5 km] W. of Baradine, *Chippendale & Constable* NSW 18539, 5.1951; Teridgerie Creek, W. of Baradine, *Constable* NSW 45961, 3.1951; Baradine, *Fraser* NSW 45970, 1.1936, *Fraser & Vickery*, 1.1936 (SYD), *Rupp* 12.1932 (SYD); Warrumbungles [Mtns] near Coonabarabran, Hartley 36, 1.1966; Coonabarabran, *Nicholson* NSW 45963, 2.1953. *Betche* NSW 45993, 1.1883; Coonabarabran to Timor Rock, *Salasoo* 2202, 1.1962; Liverpool Plains, NSW 45965. CENTRAL WESTERN SLOPES: Merrygoen [as Merrigoen] via Mudgee, *Brown* NSW 45973, 6.1899; Cobaggie Creek, 2 miles [3 km] S. of Eumungerie, *Constable* 27, 12.1961; Birriwa, *Boorman* NSW 116651, 3.1976; Merriwa, *Martin* NSW 45971, 3.1911; Narromine, *Scot* NSW 45992, 2.1915. *Hovenden* NSW 45968, 2.1922; Dubbo, *Simmons* NSW 113907, 2.1964. NORTH WESTERN PLAINS: Annual weed collected in a regeneration plot, Narraway State Forest [c. 32 km W. of Coonamble], *Hoffman* NSW 45958, 5.1957. Intergradent specimens are cited in Lee, l.c. p. 344.

13. *Crotalaria smithiana* A. Lee, Telopea 1 (5): 344 (1978); Jacobs & Pickard, Pl. New South Wales: 119 (1981); Jessop (ed.), Fl. Central Australia: 154 (1981); Cunningham et al., Pl. W. New South Wales: 388 (1981). — *C. mitchellii* Benth. var. *tomentosa* Ewart, Proc. Roy. Soc. Victoria 19: 37 (1906), replaced synonym; Ewart, Fedde Repert. 8: 404 (1910); Maiden, Proc. Linn. Soc. New South Wales 38: 245 (1913); Maiden & Betche, Census New South Wales Pl.: 106 (1916); Ewart & Davies, Fl. Northern Territory: 141 (1917); Domin, Biblioth. Bot. 22 (89²): 733 (1925). — "C.sp. (*C. mitchellii* var. *tomentosa*)" Smith, unpubl. Key to *Crotalaria*, at BRI: 2 (1961). — HOLOTYPE: MEL 1010370 !; see Lee, l.c.

[*C. mitchellii* misappl., non Benth.: Tate, Handb. Fl. Extratrop. South Australia: 66, 223 (1890), Black, Fl. South Australia, edn 2: 448 (1948), Chippendale & Murray, Northern Territory Admin., Anim. Industr. Branch, Extens. Article 2 (II): 34 (1958), Poison Pl. Committee CSIR, Pam. 49: 26 (1934) and Beard (ed.), Descriptive Cat. W. Austral. Pl. edn 2: 65 (1970).]

A soft-wooded subshrub with a strong taproot and, at first, a short, erect stem, later the stems ascending, decumbent or prostrate, often 30–50 cm long, greyish to bluish green from the dense pubescence, drying pale, the hairs of the pubescence c. 1 mm long, at first stiffly spreading then often downturned on the stems or loosely appressed on the leaves. Leaves unifoliolate, stipulate, on petioles 1.6–6 mm long, articulate and somewhat angled onto a short petiolule 1–2 mm long, the joint somewhat obscured by the pubescence, the stipules very narrow, acute, 1.5–2.5 mm long. Leaflets mostly obovate to elliptical, variable on the one plant, tapered at the base, the apex obtuse or slightly emarginate, rarely broadly acute, (1–) 1.5–3 (–5) cm long, (0.6–) 1.3–2.5 (–3) cm broad, at first densely spreading-tomentose on both sides, later the hairs less stiffly spreading, and sparse or even lacking on the upper side, then the surface obscurely dotted. Inflorescence terminal on the branches, maturing irregularly, partly at least basipetally, (3–) 5–10 (–12) cm long, on a short peduncle often only 1–2 cm long, the somewhat crowded flowers

rather small, (4) 6–8 (–10) mm long, on pedicels 1.5–2.5 mm long with stiffly spreading hairs, in the axils of small, recurved, acuminate bracts 1.5–2.5 mm long. *Calyx* more or less symmetrical, the teeth triangular, mostly 2–3 mm long and nearly equal to the tube, the whole sparsely clothed with stiffly spreading hairs shorter than those of the stem and leaf. *Petals* yellow, often reddish at the centre, the standard nearly circular, 5–7 mm long, 6–7 mm broad, the short claw 1 mm long, sometimes with fine dark stripes around the "eye" but these obscure in most dried specimens, the calli horizontal or rarely slightly oblique, extending downwards but doubtfully into the claw, the wings shorter than the keel, with a very small auricle, the keel 6.5–8 mm long, only shortly beaked and sometimes with only a very slight twist at the apex, with a pair of shallow pouches below the auricles. *Ovary* completely glabrous, or rarely with a very sparse scattering of minute hairs near the base of the suture. *Pod* inflated, glabrous with only a few (about 4) seeds in the specimens seen, more or less clavate or sometimes truncate at the apex, 1–2 cm long, 5–9 mm diam., the walls thin but firm, tapering at the base into a stipe of about 2 mm. *Seeds* rounded-oblong in outline, light and slightly reddish brown, 3.5–4.5 mm long, 2.5–4 mm broad, with a hooked radicular lobe. Fl. & fr.: after rain; collected mostly Mar.–Oct.

DISTRIBUTION: Only in the extreme northwest of New South Wales; mostly in the Simpson Desert and its extension in other States also, viz. Queensland, South Australia and the Northern Territory; on sands and sandy loams (occasionally when overlying heavy soils) of hills, and creek beds and banks (cf. map in Lee, i.e. p. 342).

NORTH FAR WESTERN PLAINS: Toona Gate, NW. of Tibooburra, *Milthorpe & Cunningham* 3421, 6.1975; "Onepah", 29° 01' S, 142° 11' E, *Mulham* W952, 1.1977; "Thurlow Downs" to "Berawinia Downs" [Paroo R. district], *Boorman NSW* 116467, 10.1912; "Berawinia Downs", *Milthorpe & Cunningham* 5043, 11.1976.

Confusion concerning the possible toxicity of *C. smithiana* has arisen from its former inclusion, as a variety, in *C. mitchellii*, but at present there is no evidence to suggest that it is harmful. In Queensland it has been recognized as specifically distinct, but Everist's publications (Proc. Roy. Soc. Queensland 74: 12–13 (1964), and Poison. Pl. Australia: 295 (1974)) do not indicate it as toxic.

14. **Crotalaria spectabilis* Roth, Nov. Pl. Spec.: 341 (1821); Candolle, Prodr. 2: 125 (1825); Senn, Rhodora 41: 326 (1939); Polhill in Milne-Redhead & Polhill (eds), Fl. Trop. E. Africa (Leguminosae, Papilionoid.): 959 (1971); Jacobs & Pickard, Pl. New South Wales: 119 (1981); Cunningham et al., Pl. W. New South Wales: 388 (1981). — HOLOTYPE: n.v.; EXAMPLES: Mt Perry [Queensland–Burnett], *Boorman NSW* 45841, 8.1912; Brisbane [Queensland–Moreton], *Boorman NSW* 45846, 12.1901.

C. sericea Retz., Observ. Bot. 5: 26 (1788), nom. illeg. non Burm. f. (1768) according to Polhill, i.e.; Domin, Biblioth. Bot. 22 (89²): 730 (1925); Wilczek, Fl. Congo Belge 4: 88 (1953); Kaur, Bull. Lucknow Natl. Bot. Gard. 87: Pl. 10 (1964).

[*C. retusa* misappl., non L.: Moore & Betche, Handb. Fl. New South Wales: 145 (1893); Maiden & Betche, Census New South Wales Pl.: 106 (1916).]

[*C. alata* misappl., non Hamilt.: F.M. Bailey, Queensland Fl. 2: 372 (1900) according to Domin, i.c.]

An erect, soft-wooded, annual shrub c. 1–2 m high, with stems single or well-branched, more or less ridged and grooved, glabrous or subglabrous and perhaps glaucous. Leaves simple, stipulate, petiolate, narrow-ovate with a fine point at the acute apex, 6–10 (–14) cm long, 1–4 cm broad, the stipules persistent, narrow-ovate, semi-ovate or narrow-triangular, acute, glabrous, up to c. 9 mm long and

2–4 mm broad, drying with a glaucous appearance like the stems, the petioles 3–6 (–8) mm long with a more or less sparse pubescence of short, coarse, pale hairs. Inflorescence notable for its prominence on the plant (often the only part collected), racemosc, terminal and in the upper axils, often up to 20 cm long in temperate climates but up to more than 40 cm, many-flowered but not dense, the peduncle very short; flowers rather large and showy, 1.5–2.5 cm long, on a slender, glabrous pedicel 8–20 mm long and subtended by a relatively large, more or less foliaceous ovate-acuminate bract 7–15 mm long and finally almost glaucous like the stems and foliage, the bracteoles like the bracts but 1–2 mm long, inserted on the pedicel near or below the middle. Calyx glabrous, black to glaucous in herbarium specimens, with five more or less equal triangular teeth (the lowest slightly narrower), 5–10 mm long, exceeding the tube of 3–5 mm, distinctly protracted abaxially when mature and contracted into a short, obscure receptacle, 1–2 mm long, at the base. Petals clear yellow, the standard with the limb nearly circular but usually slightly broader than long (14–23 mm x 14–20 mm), above a rather short, broad claw, 2–4 mm long, the calli plate-like or in an inverted V above the claw, the wings shorter than the keel, the keel broadly rounded at about the middle and woolly hairy on both edges above the claw, 14–16 mm long with the beak narrow and distinctly twisted at the apex, 8–13 mm long. Pod broadly oblong-clavate, glabrous, drying grey-black, 4–6.5 cm long, 12–15 (–20) mm diam., with c. 20–24 seeds, tapered into a short stipe remaining within the calyx, the pedicel usually a little thickened and elongate at fruiting. Seeds yellow ochre and black, both colours in apparently mature seeds, shining, flattened, oblique-cordiform with the radicular lobe hooked, 4–5 mm long, 3 mm broad. Chromosome number: $2n = 16$ (Boulter et al., New Phytol. 69: 117–131 (1970)). Fl.: any season. Fr.: mostly Summer–Autumn.

DISTRIBUTION: Occurring in Australia from coastal Queensland to the North Coast of New South Wales; a pantropical species often in weed-like growth on roadsides, etc. Native in Asia. A single collection from inland New South Wales is puzzling.

NORTH COAST: Cobaki, Tweed Heads, Gillies NSW 45843, 3.1923. NORTH FAR WESTERN PLAINS: Arrara-Lake Eliza ($29^{\circ} 25' S$, $145^{\circ} 05' E$), Paroo R., Boorman NSW 45844, 10.1912.

Everist, Poison. Pl. Australia: 291, Fig. 27 (1974), records *C. spectabilis* as unpalatable to stock so that cases of poisoning are rare in Australia. There are, however, many records, involving many different animals, of its toxicity in other countries, and alkaloids are known to be present in the species [Watt & Breyer-Brandwijk, Med. Poison. Pl. S.E. Africa, edn 2: 586 (1962) (as *C. sericea*), Webb, CSIR Bull. 232: 82 (1948), Gardner & Bennetts, Toxic Pl. Western Australia: 296 (1956), and Everist, Proc. Roy. Soc. Queensland 74: 13 (1964)]. Uphof, Dict. Econ. Pl., edn 2: 159 (1968), mentions the species as a source of green manure.

15. **Crotalaria grahamiana* Wight et Arn., Prodr. Fl. Penins. Indiae Orient. I: 194 (1834); Bentham, London J. Bot. 2: 593 (1843); J.G. Baker in J.D. Hooker, Fl. Brit. India 2: 85 (1879); L.S. Smith, unpubl. Key to *Crotalaria*, at BR1: 5 (1961); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — TYPE: n.v. — EXAMPLE: Kingscliff, on the seaward side of Cudgen Creek Bridge, Buchanan NSW 114040, 7.1966.

Synonyms for this name have not been used for Australia; for synonymy see J.G. Baker, f.c.

[Australian material of *C. grahamiana* has sometimes been misdetermined as *C. quinquefolia*. Bentham, Fl. Austral. 2: 179 (1864), and F.M. Bailey, Queensland Fl. 2: 377 (1900) and elsewhere, include only *C. quinquefolia* but L.S. Smith, f.c., distinguishes the two species, presumably from Queensland. *C. quinquefolia* is recorded by Ewart & Davies, Fl. Northern Territory: 141 (1917), but

neither species is included in the Check List of Northern Territory Plants by Chippendale, Proc. Linn. Soc. New South Wales 96: 239 (1972).]

A densely shrubby plant about 1 m high with firm, irregularly grooved and angled, silky-pubescent branches, and (5-)7-foliolate digitate leaves, petiolate and stipulate. Leaflets of thickish texture, obovate to narrow-obovate, obtuse with a minute recurved point, the longest (in our few specimens) c. 3–8 cm long and 8–25 mm broad, glabrous and minutely stippled above, densely pubescent below with loosely appressed, shining hairs almost 1 mm long, and with a pair of usually persistent, subulate stipules c. 5–10 mm long bearing a few hairs like those on the stems. Inflorescence a raceme, at first terminal, then also leaf-opposed, densely floriferous, shortly pedunculate, c. 10–20 cm long, the flowers c. 15–25 mm long, bracteate and pedicellate, the bracts narrow-ovate with setaceous tips and pubescent like the leaves, the pedicels c. 12–15 mm long, glabrous in the upper part, but pubescent below the setaceous bracteoles of c. 5 mm inserted on the lower half. Calyx large, shallow-infundibular, the broad-ovate or triangular, subequal teeth with acuminate tips about 8–12 mm long, exceeding the tube of c. 3–5 mm and the receptacle of c. 2 mm, the whole glabrous or with a few hairs on margins of the teeth, the upper two very slightly shorter and broader than the rest. Petals yellow, the standard glabrous, subcircular to transversely broad-ovate, c. 18 mm broad, 15 mm long, on a short broad claw, obtuse or slightly retuse at the apex, with two thick, inclining, plate-like calli just above the claw, the wings shorter than the keel, the keel curved erect near its middle, with a pair of deep pouches above the claw, the beak tip clearly twisted, the margins of the petals densely short- and woolly-haired near their bases, 17 mm long, 11 mm broad, the beak broad at the base, 15 mm long. Pod glabrous, more or less oblong, c. 4–5 cm long, 1.5–2 cm diam., on a tapering stipe of c. 1 cm. Seeds brownish, flattened-oblique-cordiform, c. 4 mm long, the surface glossy, minutely uneven. Chromosome number: $2n = 16$ (Chennoveraiah, M.S. & B.C. Patil, Cytologia 38: 73–79 (1973)). Fl.: Autumn–Winter. Fr.: Winter.

DISTRIBUTION: Naturalized in New South Wales only recently, in the extreme northeast of the State, but long established in Queensland. Native in India.

NORTH COAST: Kingscliff, on the seaward side of Cudgen Creek bridge, Buchanan NSW 114040, 7.1966, NSW 116454, 8.1966; "A" Block, Barcoongere Plantation, Floyd NSW 116832, 7.1974.

C.K. Atal et al., Austral. J. Chem. 22: 1773–7 (1969), report the presence of two pyrrolizidine alkaloids, monocrotaline and grahamine, in seeds of this species.

16. *Crotalaria cunninghamii* R. Br., Bot. App. in Sturt, Narr. Exped. Centr. Australia 2: 71 (1849); W.J. Hooker, Icones Pl. 9: Pl. 829 (1852); F. Mueller, Fragm. 3: 52 (1862); Bentham, Fl. Austral. 2: 182 (1864); F.M. Bailey, Syn. Queensland Fl.: 97 (1883); Tate, Handb. Fl. Extratrop. South Australia: 66 (1890); Tate, Part III (Sect. II, Botany): 152 (1896) in Spencer (ed.) Rep. Work Horn Sci. Exped. Centr. Australia; F.M. Bailey, Queensland Fl. 2: 375 (1900); Maiden & Betche, Census New South Wales Pl.: 106 (1916); Ewart & Davies, Fl. Northern Territory: 140 (1917); Black, Fl. South Australia edn 2, 2: 448 (1948); Gardner, Enum. Pl. Austral. Occid.: 62 (1930); Blackall & Grieve, How to Know Western Austral. Wildfl. 1: 240 (1954); Beard (ed.) Descriptive Cat. W. Austral. Pl. edn 2: 65 (1970); Fairall, W. Austral. Native Pl. Cult.: 100 (1970); Chippendale, Proc. Linn. Soc. New South Wales 96: 239 (1972); Jacobs & Pickard, Pl. New South Wales: 119 (1981); Jessop (ed.), Fl. Central Australia: 154 (1981); Cunningham et al., Pl. W. New South Wales: 386 (1981). — HOLOTYPE: n.v. (K), photo (NSW !).

C. sturtii R. Br., l.c. p.70. — HOLOTYPE: n.v.: "on top of the ridges in pure sand, from lat. 28°–26°, D. Sturt." From Sturt's journal this would be on the dunes around Coopers Creek, perhaps in the vicinity of present-day Innamincka.

A perennial, bushy shrub usually 1–2 m high with greyish green foliage and a velvety tomentum, rarely sparse, on stems, leaves and calyces; stems slightly ridged by decurrence of the stipular insertion through an internode, the stipules tomentose with spreading and slightly tangled hairs, narrow-ovate to subulate, c. 3–4 mm long, readily deciduous. Leaves unifoliolate on a rather long petiole, geniculate below a short petiolule, the petiole 5–25 (–35) mm long, the petiolule 2–4 (–7) mm, both densely grey at first and finally golden to darker brown. Leaflets ovate to elliptical, (3–) 4–7 (–10) cm long, 2–4.5 (–6) cm broad, the apex obtuse or broadly acute, with a small point, the hairs of the tomentum more or less loosely spreading and tangled, usually dense on both sides or slightly more below, rarely quite sparse throughout. Inflorescence very variable; sometimes a simple raceme, at others apparently a reduced compound structure with older flowers above and (? groups of) young flowers and buds below, or almost capitate (terminal and leaf-opposed), or apparently compound cymose (by early growth of one or more buds from the axil of peduncle and subtending leaf), the flowers large, (3–) 4–4.5 (–5.5) cm long, pedicellate and subtended by subulate bracts variously persistent but usually deciduous when flowers mature; pedicel (6–) 10–13 (–20) mm long, bract (4–) 8–10 (–16) mm long, both tomentose like other vegetative parts. Calyx similarly tomentose, the teeth, nearly equal in length but the upper two slightly broader than the rest; teeth (6–) 8–9 (–18) mm long sometimes cohering irregularly, the tube shorter, 3–6 mm, contracted below into a short receptacle of about 2–3 mm above the pedicel on which the subulate, tomentose bracteoles of (2–) 4–6 (–8) mm are inserted very irregularly, from close to the base to just below the receptacle. Petals green, lime-green or occasionally yellow, the standard ovate-acuminate to almost triangular, but sometimes obtuse or retuse at the very tip, varying with size of flower from 2 to nearly 4 cm long, often about 3 cm, and 1.5–2.5 cm broad, curved erect, without calli or pubescence on the short claw, striate with dark lines on both sides but stronger adaxially, the wings shorter than the other petals and with few crescent-shaped folds, the keel with a very long and fine beak twisted at its apex, c. 3–5 cm long, 1–1.5 cm broad, the beak 2.5–4.5 cm long. Ovary densely tomentose, on a short stipe. Pod usually 4–5 cm long and 1–1.3 cm in diameter, with c. 14 seeds. Seeds not seen mature even in apparently mature pods, the immature seed flat, 4 mm long, with a strongly hooked radicular lobe. Fl. & Fr.: at any time, probably rainfall-related.

DISTRIBUTION: In New South Wales only in the far northwestern corner but not uncommon on the red sand dunes of Central Australia and eremean parts of Queensland, South Australia, Western Australia (including coastal parts of Fortescue District) and the Northern Territory.

NORTH FAR WESTERN PLAINS: "Winnathee", Cunningham 1129 & Milthorpe 9.1973; Milparinka, Forster NSW 45904, 2.1910; between Bulloo (as 'Bollia') Lake and NW. corner of colony on South Australian border fence, Dickens NSW 45906, 7.1899.

There are no records of toxicity in this species, which is sometimes admired for its large flowers. It can be propagated readily from seed (Fairall, l.c.).

17. **Crotalaria virgulata* Klotsch in Peters, Reise Mossambique Bot. 1: 56 (1861); E.G. Baker, J. Linn. Soc., Bot. 42: 337 (1914); Polhill, Kew Bull. 22: 197 (1968), in Milne-Redhead & Polhill (eds), Fl. Trop. E. Africa (Leguminosae, Papilionoid.) 968 (1971); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — TYPE: n.v. (K,P). — EXAMPLES: Grafton (? cult.), Hartridge NSW 114042, 3.1958; Bellingen, Cheltenham NSW 114041, 3.1960.

Synonyms for this name have not been in use in Australia; for synonymy see Polhill, I.c. (1971).

[This species has been misdetermined in Queensland as *C. grantiana*, e.g. by L.S. Smith, unpubl. Key to *Crotalaria*, at BRI: 3 (1961).]

A soft-wooded small shrub c. 1–2 m high, annual or shortly perennial, erect or somewhat spreading, subglabrous or clothed with loosely appressed hairs on the leaves, more spreading on the terete, finely ribbed stems. Leaves trifoliolate, petiolate and stipulate. Leaflets obovate or narrow-obovate, the terminal often half as long again as the laterals and up to 25 mm long and 8 mm broad, glabrous and obscurely stippled above, softly, and sometimes sparsely, appressed pubescent to hoary below; petiole slender, c. 8–15 mm in the largest leaves; stipules linear, subulate, c. 1–2 mm long. Inflorescence 5 cm long with c. 5 or 6 flowers in New South Wales, elsewhere up to 22 cm, terminal and leaf-opposed, racemose; smaller, few- or sometimes 1-flowered, inflorescences also present (?) on reduced branches) in the leaf axils; the flowers small, c. 6–8 mm long, on very slender pedicels up to 2 cm long, subtended by minute linear bracts of 1–2 mm; bracteoles linear, spreading-ascending, pubescent like the pedicel, and inserted near its middle, c. 1–2.5 mm long, sometimes minute, obscure. Calyx of five subequal teeth, the three lowest slightly narrower and less deeply separated than the others, all narrow-triangular, 2.5–3 mm long, the tube 1–1.5 mm, contracted at the base into a scarcely discernible receptacle about 1 mm long, the unilateral protraction of the calyx base obscure. Petals yellow, the standard with a purple-brown flush or veins, hairy outside chiefly in the upper central part, sometimes glabrescent, more or less broad-ovate, 5–7 mm long, 5–6 mm broad, on a short, scarcely woolly claw of 1 mm, and with a pair of oblong calli usually vertical or inclined above it, the wings shorter than the keel, the keel upturned at right angles in the basal one-fourth of its length, 7–9 mm long, 2.5–3.5 mm broad, with a narrow twisted beak 6.5–8 mm long. Pod inflated, sessile, ellipsoid, 13–18 mm long, 5–7 mm diam., with a soft, moderately dense, spreading pubescence, more or less glabrescent outside, the hairs more woolly on part at least of the inside. Seeds (not seen) 6–12 (–18) in the pod, oblique-cordiform, c. 3 mm long, smooth, brown. Fl.: Mar. Fr.: Apr.

DISTRIBUTION: In New South Wales escaped from cultivation rather than naturalized (from the few collections seen), and not well-established in Queensland. Native in tropical east Africa, mostly south of the equator.

NORTH COAST: Grafton (?cult.), Hartridge NSW 114042, 3.1958; Bellingen, Chelman NSW 114041, 3.1960; Rollands Plains, Fox NSW 116341, 4.1972; Wang Wauk via Coolongolook, Lewis NSW 116700, 4.1976.

C. virgulata is considered by Polhill, I.c., to be a very variable species incorporating several variants previously described as species.

No records of toxicity in this species have been found.

A specimen from Taree in the North Coast of New South Wales has been identified, only tentatively since fruits are absent, as *C. macaulayae* E.G. Baker, a species closely similar to this and the following species. It seems unlikely that it will become naturalized.

18. **Crotalaria distans* Benth., London J. Bot. 2: 582 (1843); Harvey in Harvey & Sonder, Fl. Capensis 2: 43 (1861-2); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — TYPE: n.v. — EXAMPLES: The two specimens cited below.

A slender-stemmed, much branched, small, soft-wooded shrub with nearly terete, faintly ribbed, appressed-pubescent stems, the hairs pale. Leaves trifoliolate, stipulate, peltiolate. Leaflets narrow-elliptical to narrow-ovate or narrow-obovate, often obtuse with a minute point, glabrous above, hoary or shortly and rather scantily appressed-pubescent below, the terminal leaflet c. 2-3 cm long, 7-9 mm broad, distinctly longer than the laterals, the stipules narrow-linear, subulate, finally deflexed, to c. 3 mm long; petioles c. 1-2 cm long. Inflorescence racemose, terminal then leaf-opposed, usually with rather few (but often at least 8-10) and distant flowers, c. 10-30 cm long, the peduncle much shorter than the axis. Flowers c. 1 cm long, pedicellate and bracteate, the pedicels slender, loosely but rather densely appressed-pubescent with fine, curved hairs, the bracts persistent, finely subulate, c. 2-3 mm long. Calyx protracted on the lower side, the teeth triangular, attenuate, subequal but the two uppermost slightly broader and joined a little higher than the lower three, 2.5-3 mm long, exceeding the tube of 1.5-2 mm contracted into a very short receptacle at the base, appressed-pubescent like the stems, the bracteoles linear, c. 1-2 mm long, inserted close under the receptacle. Petals yellow, the standard elliptical-ovate, 10-13 mm long, 8-10 mm broad, the apex broad-acute or obtuse; lamina pubescent outside, the calli plate-like, inclined; claw short and broad, with a very narrow band of woolly hairs near the top; wings shorter than the keel; keel sharply upturned in its lower half, 10-13 mm long, 3-4 mm broad, the beak clearly and rather tightly twisted at the apex, 10-11 mm long. Pod inflated, sessile, ellipsoid, c. 10-20 mm long, 8-10 mm diam., softly pubescent, the style geniculate within the lowest one-quarter of the keel. Mature seeds not seen. Fl.: Mar.

DISTRIBUTION: Only in the far North Coast of New South Wales, probably introduced as an impurity in agricultural seed. Native of southern Africa.

NORTH COAST: Kyogle or near, District Agronomist NSW 114038, s.d.; Grafton, Penson NSW 114039, 3.1964.

The only record concerning toxicity in this species is that of a negative feeding test [see Watt & Breyer-Brandwijk, Med. Poison. Pl. S.E. Africa, edn. 2: 572 (1962)].

19. *Crotalaria medicaginea* Lamk., Encycl. Méth. 2: 201 (1786); Candolle, Prodr. 2: 133 (1825); F. Mueller, Fragm. 3: 56 (1862), Syst. Arr. Carpenterian Pl., App. in Laurie (ed.), Landsborough's Explor. Australia: 114 (1863), Fragm. 9: 157 (1875); J.G. Baker in J.D. Hooker, Fl. Brit. India 2: 81 (1876); F. Mueller, Syst. Census Austral. Pl.: 38 (1882), Second Syst. Census: 66 (1889); Tate, Handb. Fl. Extratrop. South Australia: 66, 223 (1890); Moore & Betche, Handb. Fl. New South Wales: 145 (1893); Tate, Part III (Sect. II, Botany): 152 (1896) in Spencer (ed.), Rep. Work Horn Sci. Exped. Centr. Australia; Maiden & Betche, Census New South Wales Pl.: 106 (1916); Domin, Biblioth. Bot. 22 (89²): 734 (1925); de Munk, Reinwardtia 6: 208 (1962); Backer, Fl. Java 1: 584 (1963); Polhill, Kew Bull. 22 (2): 321 (1968); Lec, Telopea 1 (5): 353 (1978); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — TYPE: n.v. — EXAMPLES: many specimens, including those cited below.

C. luxurians Benth., London J. Bot. 2: 578 (1843). — TYPE: not investigated.

C. medicaginea var. *angustata* Domin, l.c. — TYPE: n.v.; identification ex descr.

C. medicaginea var. *australiensis* Domin, l.c. — ISOSYNTYPE: Brisbane R. [Queensland—Moreton], Dietrich 915, 1863–5 (NSW!).

[*C. trifoliastrum* misappl., non Willd.: Bentham, Fl. Austral. 2: 183 (1864); F.M. Bailey, Queensland Fl. 2: 375 (1900); Ewart & Davies, Fl. Northern Territory: 141 (1917); Gardner, Enum. Pl. Austral. Occid.: 62 (1930); L.S. Smith, unpubl. Key to *Crotalaria*, at BRI: 3 (1961); Beard (ed.), Descriptive Cat. W. Austral. Pl. edn 2: 65 (1970); Chippendale, Proc. Linn. Soc. New South Wales 96: 239 (1972).]

Herbs or herbaceous subshrubs, annual or perennial, at least some with underground perenniating parts; less than 1 m and often less than 0.5 m in height, very variable in habit and morphology in the Australian populations, the stems nearly always pubescent, the hairs appressed, ascending (sometimes with the tips recurved), stiffly spreading, or reflexed to recurved, from very short to quite long. Leaves digitately trifoliate, petiolate, obscurely stipulate with the terminal leaflet exceeding the laterals. Leaflets linear to obovate or rounded-triangular, often narrow-obovate, 5–36 mm long and 1–8 mm broad, commonly 8–20 mm long and 2–6 mm broad, obtuse with a minute point, or slightly retuse at the apex, glabrous and minutely stippled above, pubescent below, the hairs usually more or less appressed, sometimes loosely, short or longish; petiole very variable in length, 2–13 mm, often 5–10 mm, the stipules linear, setaceous, usually less than 2.5 mm long, often fallen. Inflorescence a raceme mostly terminal on stem (the longest inflorescences) and branches (sometimes much shorter), from few- to many-flowered, or even with single axillary flowers through suppression of very short axillary branches, the peduncles correspondingly shorter or longer, the flowers small, falling usually into one of 3 size categories with indications of correlated stem-pubesence (distinguished by Smith, l.c.): a. – small-flowered, the keel beak 3.5–5 mm long; b. – medium-flowered, the keel beak 5.5–7 mm long; c. – large-flowered, the keel beak c. 10 mm long. Calyx protracted on the lower side, appressed-pubescent even if stem hairs spreading, the lowest tooth longest, the upper two very slightly shorter and broader than the laterals, c. 2–3 mm long, exceeding the tube of c. 1.5 mm and receptacle c. 0.5 mm long; bracteoles setaceous, inserted at or near the base of the receptacle; bracts fine, linear-subulate, 1–3 mm long, ascending like the pedicels or somewhat recurved. Petals yellow, the standard ± ovate, longer than broad, 6.5–12 mm long, 5.5–7 mm broad, without auricles, the apex acute, the calli inclined, the claw c. 1.5–2 mm long; wings c. 4.5–8 mm long; keel very small, to c. 11 mm long, 3–4 mm broad, the beak as above and very tightly twisted at the apex. Ovary pubescent. Pod small, sessile, obliquely subglobose, 2-seeded, at first pubescent, often glabrescent, c. 3 mm long. Chromosome number: $n = 8$ (Larsen, Bot. Tidsskr. 66: 38–50 (1971)). Fl.: all seasons, but fl. & fr. both chiefly in Autumn.

DISTRIBUTION: In the northeast of New South Wales; a largely tropical species extending from India through Malesia and Indonesia to Australia. Collected by Banks and Solander (1770) from Thirsty Sound, Queensland, and by R. Brown from the Gulf of Carpentaria, it is considered native in Australia. It occurs right across northern Australia, and recorded habitats range from dunes and sandy loams to rocky ground, granitic outcrops, swamps and heavy grey soils.

NORTH COAST: "Plain Station", 10 miles [16 km] S. of Tabulam, Atkinson & Quirk NSW 116456–7, 2.1973; Greenridge, McAuliffe NSW 45899, 3.1907; Copmanhurst, Rupp NSW 45879, 4.1909; Grafton, Wenholz NSW 45880, 3.1914; Rollands Plains, Fox NSW 116455, 2.1971; Taree (impurity in cultivation plot), Noonan NSW 113935, 6.1964. NORTHERN TABLELANDS: Ranges at head of the Boyd [R.], Leichhardt 363, 1.1847. NORTH WESTERN SLOPES: Gunnedah, Narr NSW 45900.

Records of toxicity in this species are confused due to unreliable identification; especially as *C. aridicola*, now recognized as the cause of Chillagoe Horse Disease (Everist, Proc. Roy. Soc. Queensland 74: 12 (1964) and Poison. Pl. Australia: 285 (1974)), was not distinguished from the complex of forms in *C. medicaginea* until relatively recently. There are, however, a number of records of possible toxicity in *C. medicaginea* itself, those in Australian literature appearing under the name *C. trifoliastrum*, e.g. Webb, CSIR Bull. 232: 82 (1948), Chippendale & Murray, Northern Territory Admin., Anim. Industr. Branch, Extens. Article 2(II): 34 (1958), Everist, l.c., and Gardner & Bennetts, Toxic Pl. Western Australia: 98 (1956), conclude that it is harmless.

The complex of taxa included here under *C. medicaginea* requires a comprehensive investigation. It shows some indication of geographic variation, with a tendency for different morphological forms to be preponderant in different parts of its range. Thus Backer, l.c., has referred the Javanese plants to "*C. medicaginea* Link forma *luxurians* Baker", while Domin, l.c., described var. *australiense* and var. *angustata* from Australia.

27. *LUPINUS L.†

Sp. Pl.: 721 (1753).

[Latin name for lupins, then applied to the "bitter" species.]

Literature: Franco & Pinto da Silva (1968); Gladstones (1974); Polhill (1976); Thompson (1961); see page 178.

Annual or perennial herbs (all the species naturalized or commonly cultivated in Australia are annual), rarely shrubby, glabrous or variously pubescent. Leaves usually digitate, clearly petiolate and with stipules adnate to the base of the petiole. Flowers often more or less verticillate, or alternate, in terminal and leaf-opposed racemes. Calyx bilabiate by deep sinuses, the lips often themselves more or less divided, the upper into two lobes, the lower into three. Petals blue to pink, yellow, white, or variegated; wings connate at the apex; keel more or less beaked. Stamens 10, all joined in a closed tube, the anthers alternately long and short. Pod dehiscent, sometimes explosively, more or less compressed, with usually some constriction between the seeds. Seeds 3–12, with a sunken hilum; almost globular to lenticular, the surface smooth or rough, dull or shining, sometimes colour-mottled, exarillate.

A genus of about 150 species, in North America and the Mediterranean region, some believed of ancient use as food plants. Recent development of improved selections has been active in Australia, first in Western Australia, but naturalization is so far very limited in New South Wales.

1. Flowers golden yellow, distinctly scented, all verticillate. Seeds smooth, somewhat lenticular, dull, brown to black marbled with white and with a white or pale mark around or on either side of the hilum, or all white in some cultivars. Leaflets narrow-obovate to oblong with a fine point, villous or silky on both sides or less densely so or glabrous above *L. luteus* 1.
- 1.* Flowers blue to pink or white, not or scarcely scented, alternate to verticillate. Seeds and leaflets various.
 2. Seeds smooth, nearly spherical, mottled or reticulated in cream, grey, buff, brown or greenish brown. Leaflets linear to linear-spathulate, glabrous above, silky below. Lower lip of calyx entire to obscurely 3-toothed. Flowers alternate to imperfectly verticillate *L. angustifolius* 2.

† by A.T. Lee

- 2.* Seeds with a scarious testa, lenticular, variously marked. Leaflets oblong-obovate to narrow-obovate, silky to villous on both sides. Flowers more or less verticillate.
3. Stem hairs 1 mm or less in length. Flowers 12–17 mm long; lower lip of calyx with 3 distinct teeth. Seeds marked with grey, brown and black *L. cosentinii* 3.
- 3.* Stem hairs 2–4 mm long. Flowers 15–20 mm long; lower lip of calyx entire. Seeds mottled in brownish red *L. pilosus* 4.

1. **Lupinus luteus* L., Sp. Pl.: 722 (1753); Candolle, Prodr. 2: 407 (1825); J. Gladstones, J. Roy. Soc. Western Australia 41: 30 (1958); Franco & Pinto da Silva in Tutin et al. (eds), Fl. Europaea 2: 105 (1968); Zohary, Fl. Palaestina 2: 44, t. 58 (1972); J. Gladstones, Western Australia Dept. Agric., Techn. Bull. 26: 17 (1974); Jacobs & Pickard, Pl. New South Wales: 124 (1981). — HOLOTYPE: n.v., No. 898.8 (LINN); see Gladstones, l.c. (1974).

An herbaceous annual up to 1 m in height, the leaves at first in a basal rosette with stipules under 1 cm long, later on erect stems, ± numerous from the base, with stipules 2–4 cm long, the stems hirsute to villous with glistening, ascending hairs c. 1–2 mm long. Leaves on long petioles; with leaflets 7–13, narrow-obovate to oblong with a fine point, villous or silky on both sides or less densely so or glabrous above, the stipules subulate. Inflorescence a raceme, terminal and leaf-opposed, with regularly verticillate flowers, the flowers perfumed, 10–13 (–16) mm long, on short pedicels of c. 2 mm, subtended by broad-obovate but caducous bracts. Petals golden yellow, the standard longer than broad, its "eye" obscure or pale in dried material, the keel with a narrow beak, drying dark near the apex. Calyx with the upper lip deeply bifid, the lower lip somewhat longer, with three short, nearly equal teeth, the bracteoles linear, inserted on the calyx at the lip-sinuses. Pod almost black under the densely villous pubescence, 4–6 cm long with 4–6 seeds. Seeds 6–8 mm x 5–7 mm x c. 3 mm, smooth, somewhat lenticular, dull, brown to black marked with white and with a white or pale mark around or on either side of the hilum (all white in some cultivars). Chromosome number: 2n = 52 (Gladstones, l.c. (1974) p.48). Fl.: early Spring (Aug., Sept.) and sometimes also in Summer and Autumn. Fr.: Summer.

DISTRIBUTION: Cultivated and occasionally naturalized in the Central Coast and South Coast Divisions of New South Wales; also in Western Australia where "Weiko" cultivars, developed originally from this species in Germany, have been in use. Native in coastal areas of the western Mediterranean region, including North Africa, and in Lebanon and Israel, the native and naturalized occurrences not always distinguishable, always on neutral or acid soils.

CENTRAL COAST: Mona Vale Road, Jacobs NSW 116573, 4.1967; Carlingford, per Hazelwood Bros NSW 116574, 9.1937. SOUTH COAST: Nowra, Rodway NSW 146880, 9.1947; "Brundee", Shoalhaven, Rodway NSW 146881, 8.1940. SOUTH WESTERN SLOPES: Wagga Wagga, Clough NSW 116575, 1.1962 (?cult.).

Gardner & Bennetts, Toxic Plants of Western Australia: 99 (1956), record heavy stock losses in Europe from ingestion of wild forms of this species.

2. **Lupinus angustifolius* L., Sp. Pl.: 721 (1753); Candolle, Prodr. 2: 407 (1825); J. Gladstones, J. Roy. Soc. Western Australia 41: 31 (1958); Franco & Pinto da Silva in Tutin et al. (eds), Fl. Europaea 2: 105 (1968); Chamberlain in Davis, Fl. Turkey 3: 39 (1970); Zohary, Fl. Palaestina 2: 43, t. 57 (1972); J. Gladstones, Western Australia Dept. Agric., Techn. Bull. 26: 9 (1974); Beadle, Stud. Fl. N.E. New South Wales 3: 397 (1976); Jacobs & Pickard, Pl. New South Wales: 124 (1981). — HOLOTYPE: n.v., No. 898.7 (LINN); see Gladstones, l.c. (1974).

L. varius L., Sp. Pl.: 721 (1753); Lee & Gladstones, Taxon 28: 616 (1979); Brummitt, Taxon 32: 624 (1983). — LECTOTYPE: n.v., photo (NSW !), No. 908. 119-414 (L-vR); see Lee & Gladstones, l.c.

An erect, much branched annual to 1.5 m high, with sparse silky pubescence, the stem hairs mostly upcurved or, later, irregularly crinkled, under 1 mm long. *Leaves* with 5–9 leaflets, the subulate stipules shortly adnate to the long petiole; the leaflets linear to linear-spathulate, obtuse, glabrous above, sparsely villous or sericeous below, 15–35 (–50) mm long, 1.5–4 (–6) mm broad, of greater size in cultivated plants. *Inflorescence* a subsessile raceme with the lower flowers alternate and those above sometimes subverticillate; flowers 11–15 mm long, unscented, on pedicels of 2–4 mm subtended by caducous, broad-ovate bracts with attenuate tips. *Calyx* with the upper lip deeply bifid, the lower lip entire or irregularly 2–3-toothed, with the bracteoles inserted in the lip-sinuses. *Petals* usually blue, tinged with purple, especially the wings, or rarely pink, purple, or white (as in most cultivars), the keel with a narrow beak, drying dark in coloured flowers. *Pod* villous (smaller in the wild forms, larger in cultivated), 3.5–5 (–6) cm long, 7–10 (–15) mm broad, with up to 6 seeds. *Seeds* more or less globular but slightly compressed, c. 8 mm diam. in specimens seen from Australia, with a smooth testa, mottled or reticulated in cream, grey, buff, brown or greenish brown. *Chromosome number:* $2n=40$ (Gladstones, l.c. (1974) p. 48). Fl.: Sept.–Oct. Fr.: Oct.–Dec.

DISTRIBUTION: Cultivated and naturalized in New South Wales, Western Australia and ? Queensland. Native in coastal areas around the Mediterranean, in southwestern France, western Spain and Portugal, and in Morocco.

NORTH COAST: Crescent Head, Barr NSW 94847, 10.1966. CENTRAL COAST: Glenfield District, per *Glenfield Vet. Res. Sm NSW 116576*, 9.1944. SOUTHERN TABLELANDS: Crookwell Shire, Gilson NSW 116577, 12.1939; Yass, Lawrence NSW 116578, 11.1955. NORTH WESTERN SLOPES: Tamworth, Loveridge NSW 116579, 10.1960. CENTRAL WESTERN SLOPES: Scone, Newling NSW 116580, 10.1920. O'Reilly NSW 116581, 11.1939; Boorowa, Shire Clerk . . . NSW 116582, 10.1928.

3. **Lupinus cosentinii* Guss., Fl. Siculae Prodr. 2: 398 (1828); J. Gladstones, Western Australia Dept. Agric., Bull. 3834: 3–5, 29 (1972). Western Australia Dept. Agric., Techn. Bull. 26: 21, 37 (1974); Jacobs & Pickard, Pl. New South Wales: 124 (1981). — TYPE: n.v.; identification of *L. cosentinii* at NSW is based on the specimen, George 1519 (NSW), det. Gladstones.

[*L. varius* misappl., non L.: Gardner & Bennetts, Toxic Pl. Western Australia: 101 (1956).]

[*L. hirsutus* misappl., non L.: Black, Fl. South Australia 2: 307 (1924) as to Fig. 138 only.]

[*L. pilosus* misappl., non Murray: Black, Fl. South Australia 2: 307 (1924) and edn 2, 2: 449 and Fig. 614 (1948).]

[*L. digitatus* misappl., non Forsk.: Gladstones, J. Roy. Soc. Western Australia 41: 31 and Pl. I, II (1958), and in other publications up to 1972.]

A much branched robust annual reaching 1.2 m in height, the stems villous with spreading or ascending hairs about 1 mm or less in length. *Leaves* with 9–11 (–13) leaflets and linear, attenuate stipules, the leaflets oblong-ovate to narrow-obovate, with a small point at the obtuse or broadly acute apex, 25–60 mm long, 7–12 mm broad, silky or somewhat appressed-villous on both sides, the hairs longer than those on the stems. *Inflorescence* a raceme on a short, stout peduncle 2–3 cm long and c. 3 mm in diameter with the flowers for the most part verticillate; flowers 12–17 mm long, scarcely scented, and on pedicels about one-third of the length of the calyx, in the axils of narrow-ovate, caducous bracts, the bracteoles similar to the bracts but narrower, inserted on the calyx at the lip sinuses. *Calyx* with a deeply bifid upper lip, the lower slightly longer and with three short and definite but sometimes obscure teeth, the pubescence of calyx, bracts and bracteoles like that of the leaflets. *Petals* bright blue, the standard with a yellow to white "eye"

extending nearly to the apex, the keel 3 mm broad, curved rather than bent upward, and shortly tapered to the apex, scarcely beaked, the apex darker in colour. Pod densely villous, 40–50 mm long, 13–16 mm diam., with 3–5 seeds. Seeds rounded-quadrangular, compressed, 6–9 mm x 4–7 mm x 3–4 mm, the testa scabrid, marked in grey, brown and black and with a dark line on both sides of, or around, the hilum. Chromosome number: $2n = 32$ (Gladstones, l.c. (1974) p.48). Fl.: from early Spring. Fr.: late Spring to Summer.

DISTRIBUTION: Naturalized, to a limited extent in New South Wales and South Australia, but also in Western Australia where it is successful in cultivation and as a volunteer; mainly in sandy soils of coastal and subcoastal localities. Native, in similar situations, in Morocco and other western and central Mediterranean localities.

NORTH COAST: Reserve Creek, Murwillumbah district, Pratt NSW 116598, 5.1967. CENTRAL COAST: Woy Woy, Hamilton NSW 116599, 10.1912; per Glenfield Vet. Res. Sm NSW 136883, 10.1941.

4. **Lupinus pilosus* Murray in L., Syst. Veg. edn 13: 545 (1774); J. Gladstones, J. Roy. Soc. Western Australia 41: 31, Pl. 1, II (1958), Western Australia Dept. Agric., Techn. Bull. 26: 26 (1974); Franco & Pinto da Silva, Feddes Repert. 79: 52 (1968), as *L. varius* [misappl.] ssp. *orientalis*, "basionym: *L. pilosus* Murr.", and in Tutin et al. (eds), Fl. Europaea 2: 106 (1968), as *L. varius* ssp. *orientalis*; Zohary, Fl. Palaestina 2: 41 (1972). — TYPE: n.v.; see Lee & Gladstones, l.c. p.620, footnote 10.

L. hirsutus L., Sp. Pl.: 721 (1753), non edn 2: 1015 (1763); Lee & Gladstones, Taxon 28: 618 (1979); Jacobs & Pickard, Pl. New South Wales: 124 (1981); Brummitt, Taxon 32: 624 (1983). — LECTOTYPE: n.v., photo (NSW), No. 908.119-125 (L-vR); see Lee & Gladstones, l.c.

[The name *L. pilosus* was misapplied by Black to *L. cosentinii* q.v.]

[*L. varius* misappl., non L.: Chamberlain in Davis (ed.), Fl. Turkey 3: 40 (1970)].

An erect, sparsely branched annual 30–80 cm high, the stems and petioles softly villous with loosely spreading hairs 2–4 mm long, mostly somewhat reflexed with age, at first white, turning golden brown in dried material. Leaves with (7–) 9–11 leaflets, the linear subulate stipules adnate for nearly half their length to the long petiole, the leaflets 2.5–6 cm long, 10–18 mm broad, oblong-obovate, softly villous on both sides, the apex broadly acute with a small point accentuated by the long hairs and usually recurved. Inflorescence a raceme of verticillate, sometimes imperfectly, flowers, the flowers scarcely scented, large, 15–20 mm long, on pedicels half to two-thirds as long as the calyx and subtended by narrow-ovate to linear-subulate, caducous bracts. Calyx villous, the upper lip deeply bifid, the lower lip longer, entire, narrow-acute, with a pair of narrow, attenuate bracteoles inserted on the calyx at the lip-sinuses. Petals blue, the standard deep blue, with an extensive white "eye" reaching nearly to the apex and becoming purple with age, occasionally the petals pink or white, especially in cultivated selections; the keel narrow throughout, c. 3–4 mm broad, tapered to the narrow-obtuse but scarcely beaked tip, and only slightly darker in colour upwards. Pod 5–8 cm long, villous, with 2–4 seeds. Seeds large and markedly scabrous, somewhat compressed, 10–14 mm x 9–12 mm x 6–8 mm, mottled in brownish red with a dark crescent around the hilum. Chromosome number: $2n = 42$ (2 counts in Gladstones, l.c. (1974) p. 48); $2n = 40$ (1 count, l.c.). Fl.: probably in late Winter to early Spring.

DISTRIBUTION: Naturalized in Australia, in New South Wales and Western Australia, to a very limited extent and doubtfully persisting. Native in eastern Mediterranean countries from Greece to Syria, Lebanon, Israel and western Jordan.

CENTRAL COAST: Mangrove, near Gosford, per Dept. Agriculture NSW 116583, 7.1930.

28. *CYTISUS L.[†]

Sp. Pl.: 739 (1753).

[Greek: *kytisos*, name of a fodder plant — believed to be *Medicago arborea*, but with trifoliate leaves like many *Cytisus* species.]

Literature: Frodin & Heywood (1968); Polhill (1976), Thompson (1961); see page 178.

The genus *Cytisus* has suffered many changes in circumscription as knowledge concerning it and related taxa has grown. Over many years, fragmentation seemed to be logical, and a number of genera were set up to accommodate marginal taxa or taxa intermediate between *Cytisus* and *Genista*, its major relative. Now, an extensive review of the morphology of most of the species concerned has shown *Cytisus* and *Genista* to be taxa with definable generic boundaries, and it is this again-broader sense which is accepted here. Several generic names now become synonyms of *Cytisus*, those pertinent to this Flora being two in which our two naturalized species have been placed in the past: *Chamaecytisus* Link and *Sarothamnus* Wimm.

Small trees, shrubs or herbaceous plants of varied habit, usually with unarmed branches (as in New South Wales), occasionally the branches spine-tipped. Leaves often 3-foliate and petiolate, sometimes modified on young or flowering branches (simple, 1-foliate, or reduced), or all simple; stipules small, adnate to the leaf-base, or absent. Inflorescence terminal, often complex, the flowers in racemes or heads, or in the leaf axils on condensed branch systems forming leafy "racemes" or heads, sometimes compound. Calyx campanulate to tubular, bilabiate, the upper lip with 2, the lower with 3 small teeth. Petals yellow to white, occasionally pink or purplish, or (in horticultural forms) partly brown; standard lamina usually elliptical to circular; keel with the lamina less than 2.5 times as long as broad, always curved on the lower edge, often slightly and obtusely beaked, usually glabrous. Stamens 10, all joined in a closed tube, the anthers alternately basifixied (and often longer) and dorsifixied (and often shorter). Pod chartaceous to somewhat coriaceous, dehiscent, sessile or shortly stipitate, usually with several to many seeds. Seeds often (as in the species here), but not always, arillate, the slender funicle inserted centrally into a high, collar-like aril.

A genus of about 60 species in Europe, northern Africa, and the Canary Is., just reaching eastern Mediterranean countries ("Middle East"); 2 species are naturalized in temperate Australia, in New South Wales, Victoria, Tasmania and South Australia.

1. Calyx tubular, much longer than broad; leaves 3-foliate, densely pubescent below with shining hairs *C. prolifer* 1.
1. * Calyx campanulate, about as long as broad; leaves often reduced or absent, glabrous or nearly so *C. scoparius* 2.

1. **Cytisus prolifer* L.f., Suppl. Pl.: 328 (1781); Anderson, Contr. New South Wales Natl. Herb. 1(1): 23 (1939); Black, Fl. South Australia edn 2, 2: 450, Fig. 618 (1948); Curtis, Stud. Fl. Tasmania 1: 147 (1956); Polhill, Bot. Syst. 1: 347 (1976); Jacobs & Pickard, Pl. New South Wales: 119 (1981), (as *Cystisus prolifera*). — *Chamaecytisus proliferus* (L.f.) Link, Handb. Erkenn. Nutzbar. Häufig. Vorkommenden Gewächse 2: 154 (1831); Willis, Handb. Pl. Victoria 2: 284 (1973);

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Beadle, Stud. Fl. N.E. New South Wales 3: 397 (1976); Cunningham et al., Pl. W. New South Wales: 386 (1981). — TYPE: not investigated.

Large shrubs or small trees with graceful arching branches, commonly reaching 3–4 m in height, with a slightly grey-green aspect. Leaves trifoliolate. Leaflets elliptical to obovate, often 15–25 mm long, 6–10 mm broad, the apex obtuse with a fine but not spiny point, finely dotted on both sides, glabrous above, appressed-pubescent with short, fine, shining hairs below. Inflorescence a compound head (? umbel), each flower solitary (? by reduction) with a pair of linear, long-pubescent, caducous bracteoles near the top of a short pedicel, subtended by a linear, long-pubescent bract and borne at the apex of a slender peduncle 1–2 cm long, the peduncles in an ?umbel at the apex of a short, tomentose branch bearing short, triangular bracts (some leafy) around the peduncles with other similar but sterile bracts below, the flowers c. 2 cm long. Calyx tubular, much longer than broad, c. 10–12 mm long, pubescent with rather long, pale, softly spreading hairs, two-lipped to the middle, the lips with distinct, narrow teeth, each about one-third of the lips in length. Petals white, the standard lamina elliptical, slightly longer, 15–20 mm, than broad, 12–15 mm, without auricles but with a narrow V-shaped thickening above the slender claw, the wings and keel about equal in length but shorter than the standard. Stamens with anthers long and basifixated alternating with short and dorsifixated. Ovary pubescent, with a few scattered hairs along the style, the stigma a small, terminal disc. Pod more or less densely pubescent. Seeds 6–7, black, smooth with a slight gloss. Chromosome number: $2n = 48$ (Borgen, Nytt Mag. Bot. 16: 18–21 (1969)). Fl.: Spring. Fr.: early Summer.

DISTRIBUTION: Widely distributed in cultivation, and often escaped in country towns of New South Wales (especially in disturbed ground), and in Victoria, Tasmania, South Australia and Western Australia. Native in Tenerife, Canary Is.

CENTRAL COAST: Cheltenham, Johnson NSW 116735, 8.1946; . . . Lindfield fire trail towards Lane Cove National Park, Seur 301, 9.1975. CENTRAL TABLELANDS: Capertee, Lee NSW 116750, 6.1976; Orange, Rodway NSW 116732, 11.1949; Mt Wilson, Johnson NSW 116733, 9.1949; Leura, Johnson NSW 116734, 11.1954; between Cataract Falls and Adelina Falls, Lawson, Coveny 7745 & Hind, 7.1976; Colo Vale, Cheel NSW 116731, 8.1908. SOUTHERN TABLELANDS: Barbers Creek, Rumsey NSW 116736, 10.1898; Yass, Dwyer NSW 116737, 9.1911; 1 km from Lake George on Canberra road, Powell 107, 9.1975; foot of Black Mtn, A.C.T., Derbyshire 1227, 10.1963; SE. base of Black Mtn, A.C.T., McKee 9592, 9.1962; foot of Mt Jerrabomberra, Beeton CBG 014206, 10.1965; base of Mt Jerrabomberra, Queanbeyan, Gray & Totterdell 6248 10.1968. CENTRAL WESTERN SLOPES: bushy hill e. 1 mile [1.5 km] NW of Grenfell, Salasoo 2946, 12.1964. NORTH WESTERN PLAINS: Cobar, Abrahams NSW 116743, 1910. SOUTH WESTERN PLAINS: Condobolin, Cunningham & Milthorpe 5435, 9.1978.

2. **Cytisus scoparius* (L.) Link, Enum. Pl. Horti Regii Bot. Berol. Altera 2: 241 (1822); Williamson in Ewart, Fl. Victoria: 666 (1931); Anderson, Contr. Natl. Herb. New South Wales 1(1): 23 (1939); Black, Fl. South Australia edn 2, 2: 450 (1948); Frodin & Heywood in Tutin et al. (eds), Fl. Europaea 2: 89 (1968); Polhill, Bot. Syst. 1: 347 (1976); Beadle, Stud. Fl. N.E. New South Wales 3: 397 (1976); Jacobs & Pickard, Pl. New South Wales: 119 (1981). — *Spartium scoparium* L. (basionym), Sp. Pl.: 709 (1753). — *Sarothamnus scoparius* (L.) Wimmer ex W. Koch, Syn. Fl. German. Helv.: 152 (1837); Curtis, Stud. Fl. Tasmania 1: 146 (1956); Beadle, Evans & Carolin, Handb. Vasc. Pl. Sydney Distr.: 255 (1963); Beadle, Evans & Carolin, Fl. Sydney Region: 303 (1972); Willis, Handb. Pl. Victoria 2: 284 (1973). — TYPE: not investigated.

Two subspecies are recognized in Europe (Frodin & Heywood, l.c.) but all the Australian material referred to this species appears to belong to ssp. *scoparius*. It is distinguished by its erect habit (not procumbent as in ssp. *maritimus*), and glabrous to sparsely sericeous young branches (not densely sericeous).

Large virgate, often leafless shrubs with erect or ascending branches to 2–3 m in height, or procumbent (occasionally with some erect branches in the centre) to 40 cm high, the branches dark-green, 5-angled, glabrous to densely sericeous when young. Leaves 3-foliate and petiolate, but often modified or reduced (e.g. 1-foliate, and/or sessile, on young twigs or flowering branches), or caducous. Leaflets elliptic-oblong to obovate, glabrous or with some appressed pubescence, 6–20 mm long, 1.5–9 mm broad. Inflorescence pseudoracemose, of axillary, single or paired flowers on pedicels c. 5–8 mm long subtended by broad, rather thick-textured obovate bracts (? leaves) and with 2 or 3, not regularly paired, often unequal bracteoles (or ? 1 bract, 2 bracteoles) on the pedicel, the flowers c. 2 cm long. Calyx campanulate, glabrous and slightly glaucous, 2-lipped to near the middle, the upper and lower lips minutely 2- and 3-toothed respectively. Petals cream or yellow, sometimes (in horticultural forms) partly reddish brown, the standard lamina without auricles or calli, slightly broader, c. 16 mm, than long, c. 14 mm, the wings and keel similar in length to the standard, the keel very obtuse. Stamens with anthers alternately basifixcd and dorsifixcd, but nearly equal in length. Ovary glabrous on the sides, long-ciliate on both edges with pale hairs, a few continuing onto the lower part of the style, the style long and more or less coiled within the keel, expanded towards the end and then contracted into a minute capitate stigma. Pod oblong, flattened, about 2.5–4 cm long, 8–10 mm broad, the marginal hairs persisting and the sides black. Seeds c. 12, black with a yellowish aril. Chromosome number: $2n = 46$ for ssp. *scoparius*, $2n = 48$ for ssp. *maritimus* (Gill & Walker, Watsonia 8: 345–356 (1971)); $2n = 46$ is recorded in Frodin & Heywood, l.c., for both subspecies. Fl.: Spring and early Summer. Fr.: Summer, until Mar.

DISTRIBUTION: Naturalized in all the Tableland subdivisions and in the Central Western Slopes of New South Wales, and in Victoria, Tasmania and South Australia; originally in garden cultivation and now, usually in the Tablelands, assuming significance as a weed. Native in western, southern and central Europe, extending north to southern Sweden and east to the Ukraine.

NORTHERN TABLELANDS: Glencoe Village, Chaffey NSW 116757, 10.1970; Llangothlin, New England, Grey 3487, 4.1956; Tomalla, Barrington Tops, Earp NSW 116758, 11.1952; c. $\frac{1}{2}$ mile [0.8 km] W. of Careys Peak, Barrington Tops, Pickard 814, 12.1969. CENTRAL TABLELANDS: Sunny Corner, Boorman NSW 116749, 11.1899; near Lithgow, Garden NSW 116751, 10.1949; Bilpin, Constable NSW 16353, 10.1950; Coxs R., Cambage 1172 & Maiden, 10.1904; Blackheath, Constable NSW 11636, 1.1948; Megalong Valley, Forster NSW 81644, 1.1966; Katoomba, Evans, 1.1928 (SYD); Leura, Stafford NSW 140882, 11.1952. SOUTHERN TABLELANDS: Yass, Dwyer NSW 146883, 10.1911; Braidwood, Betché NSW 116753, 12.1891, Cambage 2015, 10.1908; Jillamalang Mtn near Braidwood, Boorman NSW 116756, 3.1909; 20 miles [32 km] S. of Braidwood, Rodway NSW 116755, 12.1940; near Cooma, Costin NSW 116754, 11.1948. CENTRAL WESTERN SLOPES: Boorowa, Shire Clerk NSW 116752, 12.1925.

28a. *GENISTA L.†

Sp. Pl.: 709 (1753).

[Latin name for this plant.]

Literature: Gibbs (1968); Gibbs & Dingwall (1971); Polhill (1976); Thompson (1961); see page 178.

Usually shrubby plants, occasionally herbaceous, the branches usually ribbed, sometimes and variously modified, often spine-tipped (but not in the species in New South Wales). Leaves digitately 3-foliate, sessile or petiolate, or 1-foliate or simple; stipules various but fused to the leaf base, rarely absent.

† by A. T. Lee

Flowers in terminal racemes, pseudoracemes or heads, less often axillary on modified short shoots, the bracts narrow, or foliaceous (especially those low on the rachis), sometimes carried high on the pedicel, the bracteoles usually small but sometimes enlarged. *Calyx* bilabiate, shorter than, to as long as, the corolla, the two lobes of the upper lip often largely separate, more than one-third of the total calyx-length; lower lip 3-toothed. *Petals* yellow, the standard with the lamina often broadest below the middle, trullate to triangular to broad-ovate or -elliptic, sometimes acute at apex, the keel narrow-oblong, obtuse, with the lamina more than 2.5 times as long as broad, often hairy, usually straight or nearly so along the lower edge. *Stamens* 10, all joined in a closed tube, the anthers alternately long and basifixed and shorter and dorsifixed, sometimes apiculate. *Style* slender, straight along the base of the keel, then curved up abruptly (in old flowers often hook-like). *Pod* sessile or subsessile, dehiscent, one- to several-seeded. *Seeds* arillate in some Sections only (but including the species naturalized in New South Wales), the aril collar-like.

A genus of about 80 species, from the Canary Is and Mediterranean region to western Asia and northern Europe. Three species, all in Section (previously Genus) *Teline*, are naturalized in New South Wales.

1. Leaves with a petiole at least 2 mm long; leaflets obovate to elliptic, the margins flat.
2. Leaflets generally elliptic, to oblong or narrow-obovate, pubescent below with closely appressed, colourless or pale hairs; petioles of largest leaves usually more than 5 mm long. Flowers usually distinctly racemose on short axillary branches, 5-12 in the inflorescence, the rachis longer than the peduncle *G. stenopetala* 1.
- 2.* Leaflets generally obovate to narrow-obovate, glabrous or pubescent below, but then the hairs usually somewhat more loosely appressed; petioles less than 5 mm long. Flowers in clusters or very short racemes, 3-9 in the inflorescence, the rachis about equal to the peduncle *G. monspessulana* 2.
- 1.* Leaves sessile or almost so; leaflets linear to narrow-oblong, the margins recurved *G. linifolia* 3.

1. **Genista stenopetala* Webb et Berth., Phyt. Canar. 3(2): t. 45 (1836). — *Teline stenopetala* (Webb et Berth.) Webb et Berth., Phyt. Canar. 3(2): 39 (1836); Gibbs & Dingwall, Bol. Soc. Broteriana 45: 282 (1971); Beadle Evans & Carolin, Fl. Sydney Region: 302 (1973). — TYPE: The Plate cited is accepted as the Type (photocopy NSW).

[*Genista maderensis* misappl., non (Webb et Berth.) Lowe: Beadle, Evans & Carolin, Handb. Vasc. Pl. Sydney Distr.: 255 (1963); Eichler, Suppl. Black's Fl. South Australia: 187 (1965); Jacobs & Pickard, Pl. New South Wales: 122 (1981).]

[*Cytisus canariensis* misappl., non "(L.) Steud.": (?) Black, Fl. South Australia edn 2, 2: 450 (1948). Eichler, l.c., interprets Black's entry under *C. canariensis* as "*G. maderensis*" (the name accepted by Eichler for the present species), but the illustration and most of the description seem rather to indicate *G. monspessulana* q.v.]

The above are excerpts from detailed synonymy in Gibbs & Dingwall, l.c. The plant naturalized in Australia appears to belong to *T. stenopetala* var. *microphylla* Pit. et Proust, and Gibbs & Dingwall distinguish *G. stenopetala* from *G. maderensis* in their key to the species, though the two have sometimes been treated as conspecific.

Small trees to about 3.6 m in height, or large shrubs with numerous erect or ascending, puberulent to almost glabrous, finely ridged stems. *Leaves* on petioles often 4-5 mm long, the 3 digitate leaflets commonly 15-20 mm long, narrow-

elliptical, or occasionally some narrow-obovate, obscurely appressed-pubescent below and less densely above, and with a fine but not spiny point. Inflorescence of c. 5–12 flowers, terminal on stems and lateral branches, subtended by one (or more?) trifoliolate, leafy bracts, the rachis, and peduncle of up to 3 cm, closely short-pubescent. Flowers bright yellow, on slender pedicels 2–3 mm long, each in the axil of a narrow bract, and with a pair of similar but smaller bracteoles inserted just below the calyx; pedicel, bract, bracteoles and calyx all pubescent like the rachis. Calyx c. 5 mm long, two-lipped to the middle or a little below, the two broad teeth of the upper lip a little longer than the lip-sinus, the three narrow teeth of the lower lip pressed together and scarcely half as long as the lip. Petals bright yellow, the standard slightly longer, c. 8 mm, than broad, c. 6 mm, glabrous, on a slender claw and without auricles or calli, the wings obtuse, c. 7 mm long, with prominent crescent-shaped folds, the keel c. 8 mm long. Stamens with anthers alternately long and basifix and shorter and dorsifix. Ovary pubescent with rather long, straight, silky hairs. Pod densely pubescent even when old, with c. 5–7 seeds. Chromosome number: $2n = 48$ (Santos in Darlington & Wylie, Chromosome Atlas of Flowering Plants, edn 2 (1955)). Fl.: Spring (Aug.–Oct.). Fr.: Summer.

DISTRIBUTION: Escaped from cultivation and reproducing freely from seed in a few localities in the Central Coast of New South Wales and in South Australia. Native in Madeira Is.

CENTRAL COAST: Epping railway station, Evans NSW 116816, 10.1955; Epping, Evans NSW 58979, 5.1962, NSW 63051, 10.1962, Rowell NSW 116815, 9.1974.

2. **Genista monspessulana* (L.) L. Johnson, Contr. New South Wales Natl. Herb. 3(3): 98 (1962); Eichler, Suppl. Black's Fl. South Australia: 187 (1965); Willis, Handb. Pl. Victoria 2: 283 (1973); Jacobs & Pickard, Pl. New South Wales: 122 (1981). — *Cytisus monspessulanus* L. (basionym), Sp. Pl.: 740 (1753); Curtis, Stud. Fl. Tasmania 1: 146 (1956). — *Teline monspessulana* (L.) C. Koch, Dendrologie 1: 30 (1869); Gibbs in Tutin et al. (eds), Fl. Europaea 2: 93 (1968); Beadle, Evans & Carolin, Fl. Sydney Region: 302 (1972); Beadle, Stud. Fl. N.E. New South Wales 3: 397, Fig. 176E (1976); Cunningham et al., Pl. W. New South Wales: 422 (1981). — TYPE: not investigated.

Genista candicans L., Centuria 1, Pl.: 22 (1755); Beadle, Evans & Carolin, Handb. Vasc. Pl. Sydney Distr.: 255 (1963) as “*G. candicans* Justl.” — *Cytisus candicans* Lamk., Fl. France 2: 623 (1778). — TYPE: not investigated.

[*Cytisus canariensis* misappl., non “(L.) Steud.”: Williamson in Ewart, Fl. Victoria: 667 (1931); Anderson, Contr. New South Wales Natl. Herb. 1(1): 23 (1939); Black, Fl. South Australia edn 2, 2: 450 (1948) at least as to Fig. 617.]

Very similar to the previous species but perhaps shorter and more shrub-like, to 2.5 m in height, the pubescence often of rather longer and less closely appressed hairs, the leaflets usually slightly shorter, and obovate in outline, the short-acute apex broader than the tapered base, though still with a fine point, the petiole shorter, sometimes almost absent above the pulvinus, 2–4 mm long, the flowers often slightly smaller and fewer (3–9) in the raceme or cluster on a shorter rachis (thus a more clustered inflorescence), on very short pedicels up to 2 mm long. Pod compressed, swollen over the seeds, rather densely covered with long, c. 1 mm, loosely spreading tawny hairs, the seeds 6–7, arillate with a small, tan-coloured aril. Chromosome number: $2n = c. 26$ (de Castro, Agron. Lusit. 11: 85 (1949) as *Cytisus monspessulanus*; $2n = 48$ (*ibid.*, for the synonym *Cytisus candicans*)). Fl.: Spring, Sept.–Oct. and occasionally also in Autumn. Fr.: chiefly in Summer.

DISTRIBUTION: Commonly naturalized in southeastern New South Wales, and in Victoria, Tasmania, South Australia and Norfolk I.; along roadsides, and on vacant and waste lands. Native in the western Mediterranean region, Portugal and the Azores.

CENTRAL COAST: Frenchs Forest, *Coveny NSW 100005*, 8.1964; Pymble, *Johnston NSW 116835*, 9.1952; Castle Hill, *Hamilton NSW 116834*, 10.1911; Eastwood, *Evans NSW 63052*, 10.1962; Flat Rock Creek, Willoughby, *Seur 345*, 8.1976; Concord, *Coveny NSW 116820*, 9.1964. CENTRAL TABLELANDS: Orange, *Abrahams NSW 116839*, 5.1911; S. side of South Bowenfels, *Briggs 6249 & Johnson*, 11.1975; Mt Wilson, *Johnson NSW 116837*, 9.1949; Moss Vale, *Cheel NSW 116836*, 4.1910; Bundanoon, *Holford NSW 116833*, 10.1957. SOUTHERN TABLELANDS: Bowning, *Stadtmauer NSW 116819*, 10.1957; Goulburn, *Lumsden NSW 116838*, 10.1906; Highway, Canberra-Lake George, *Moore 2728 (bis*, as "Canberra-Goulburn"), 10.1953; 1 km from Lake George on Canberra road, *Powell 108*, 9.1975; SW. base of Black Mtn, A.C.T., *McKee 9619*, 10.1962. SOUTH WESTERN SLOPES: 1 mile [1.5 km] S. of Burrumbuttock on Albury road, *Armstrong 136*, 2.1973. SOUTH WESTERN PLAINS: N. bank of Murray R. near Torumbarry Weir, *Mulham 1275*, 3.1978.

3. **Genista linifolia* L., Sp. Pl.: 709 (1753); Eichler, Suppl. Black's Fl. South Australia: 187 (1965); Willis, Handb. Pl. Victoria 2: 284 (1973); Jacobs & Pickard, Pl. New South Wales: 122 (1981). — *Cytisus linifolius* (L.) Lamk., Fl. France 2: 624 (1778). — *Teline linifolia* (L.) Webb et Berth., Phytogr. Canariensis 3 (2): 41 (1842); Gibbs in Tutin et al. (eds), Fl. Europaea 2: 94 (1968); Beadle, Evans & Carolin, Fl. Sydney Region: 302 (1972); Cunningham et al., Pl. W. New South Wales: 422 (1981). — TYPE: not investigated.

Rather large shrubs to c. 3 m in height, the branches erect and spreading, finely ridged and closely appressed-pubescent. Leaves digitately trifoliolate, sessile or almost so, the base persisting after the leaflets fall as a small projection decurrent on the stem, the leaflets 10–15 mm long, linear to very narrow-obovate, finely appressed-pubescent, glabrescent and dark green above, densely sericeous and pale below, the margins strongly recurved and often leaving only the midrib exposed. Inflorescence short, racemose, the inflorescences crowded near the apex of stems and of short lateral branches; the peduncle subtended by a trifoliolate bract similar to the leaves, the flowers c. 1 cm long on a pedicel 2–3 mm long in the axil of a narrow, linear bract, and with a pair of linear bracteoles inserted just below the calyx. Calyx c. 6–8 mm long, densely appressed-sericeous, bilabiate, the upper lip of 2 separate lobes, the lower lip with 3 shorter teeth, the lips (and upper lobes) about twice as long as the calyx tube. Petals yellow, the standard ± pubescent on the back, broad-elliptic, without auricles, c. 10 mm long, 7 mm broad. Stamens with anthers alternately long and basifix and shorter and dorsifix. Ovary densely pubescent. Pod densely pubescent with long, lax hairs, the seeds brownish, usually 2–4 in the pod, with an orange collar-like aril. Chromosome number: $2n = 48$ (Fernandes, Mem. Soc. Brot. 21: 343–385 (1970/71)). Fl.: Spring. Fr.: Summer.

DISTRIBUTION: Naturalized in New South Wales, Victoria and South Australia; usually in waste ground in the vicinity of populated places, sometimes tenaciously persistent. Native in the western Mediterranean region.

CENTRAL COAST: Thornleigh, *Coveny NSW 116747*, 9.1965; Lindfield, *Ileydon NSW 146885*, 9.1978; northern end of Garden Island Naval Depot, *Benson 1220 & Rodd*, 4.1977; Rookwood Cemetery, near Berala, *Price NSW 117343*. CENTRAL TABLELANDS: near Moss Vale railway station, *Green NSW 116748*, 11.1964. SOUTH WESTERN PLAINS: 15 miles [25 km] E. of Deniliquin, *Leigh S512*, 10.1966.

29. *ULEX L.†

Sp. Pl.: 741 (1753).

[Latin name for an unidentified shrub — according to Pliny "an herb, like rosemary, that draws gold to it".]

Literature: Guinea & Webb (1968); Polhill (1976); Thompson (1961); see page 178.

† by A.T. Lee.

Dense shrubs with a complex system of spine-tipped structures, viz. phyllodes, subtending eladodes similar in appearance to the phyllodes but usually branched and distinguishable as "long" or "short" shoots. *Long shoots* bearing numerous branches, each branch subtended by a "primary" phyllode. *Short shoots* usually with 2–8 nodes marked by "secondary" phyllodes and ending in "terminal" spines, the lateral branches of short shoots consisting of, or ending in, "lateral" spines. *Leaves* when present alternate, exstipulate, trifoliate in the juvenile state, soon replaced by linear, dark green, pungent, phyllodes. *Flowers* apparently axillary, or crowded towards the ends of branches into racemose or umbellate inflorescences. *Calyx* deeply bilabiate. *Petals* yellow. *Stamens* 10, all joined in a closed tube, the anthers dimorphic, alternately long and basifixied and short and dorsifixied. *Pod* dehiscent, scarcely exserted from the ealyx, with 1–6 seeds. *Seeds* with a conspicuous collar-like aril.

A genus of about 10 species, in Europe and northern Africa; one species naturalized in Australia.

**Ulex europaeus* L., Sp. Pl.: 741 (1753); Blaek, Fl. South Australia edn 2, 2: 450 (1948); Curtis, Stud. Fl. Tasmania 1: 146 (1956); Beadle, Evans & Carolin, Handb. Vase. Pl. Sydney Distr.: 255 (1963); Guinea & Webb in Tutin et al. (eds), Fl. Europaea 2: 102 (1968); Beadle, Evans & Carolin, Fl. Sydney Region: 302 (1972); Willis, Handb. Pl. Victoria 2: 283 (1973); Jacobs & Pickard, Pl. New South Wales: 129 (1981). — TYPE: not investigated.

Two subspecies are recognised in Europe (Guinea & Webb, i.e.) but all the Australian material referred to this species falls into ssp. *europaeus*. It is distinguished by its ovate bracteoles, 2–4 mm broad, with acute apices (not subcircular, 4–7 mm broad, obtuse, as in ssp. *latebracteatus*) and chromosome number $2n = 96$ (not $2n = 64$).

Very spiny shrubs with erect or ascending branches, mostly 0.6–2 m high, the branches hirsute to tomentose and somewhat glaucous when young. Primary phyllodes c. 8 mm long, the terminal spines 12–30 mm, stout, straight, glabrous, ridged, minutely scabrid. Flowers usually one only in the axil (perhaps by reduction of a short axillary branch), each subtended by a green phyllode, and a yellowish bract. Calyx yellowish, densely covered with loosely appressed to spreading hairs, 2-lipped to the base, with two small teeth in the upper lip and three of similar length in the lower, the whole 10–15 mm long. Bract and bracteoles more or less ovate, the latter much longer, and inserted just below the ealyx. Petals yellow, all of more or less equal length and almost enclosed in the ealyx. Stamens all joined in a tube, with 5 long, basifixied anthers alternating with 5 shorter and dorsifixied. Ovary long-haired, the style much incurved at its expanded end. Pod dark brown to blackish, densely shaggy-haired, 11–20 mm long, with 8–10 seeds. Seeds arillate, light brown, somewhat glossy. Chromosome number: $2n = 64$ (de Castro, Agron. Lusit. 3: 104 (1941)); $2n = 96$ (Tsehechow, Izv. Tomsk. otd. Gosud. Russk. Bot. Obse. 3: 121 (1931)). Fl.: any time but chiefly Winter and early Spring. Fr.: mostly Summer.

DISTRIBUTION: Naturalized in New South Wales, Victoria, Tasmania and South Australia, and likely to become a troublesome weed if not promptly controlled. Native in western Europe, extending east to Italy. A cultivated double-flowered variant is infertile, but the degree of "doubleness" varies and so may the fertility.

NORTH COAST: West Kempsey, St Hill NSW 116780, 7.1960; Rainbow Reach via Kempsey, Leggett NSW 116782, 7.1967. **CENTRAL COAST:** Lisarow, Coveny 6471 & Powell, 6.1975; N. end of Garden Island Naval Depot, Benson 1219 & Rodd, 4.1977; Undercliffe, Boorman NSW 116787, 6.1908; Cooks R., Hamilton NSW 116783, 8.1912; Kingsford Smith Aerodrome, Mascot, Constable 5956, 6.1965; Stanwell Park, Fraser NSW 119785, 1.1934; Port Kembla, Rodway 2138, 3.1936; Kangaroo Valley, Rodway 1089, 6.1933. **CENTRAL TABLELANDS:** Orange, Nalder NSW 116776, 116777, 5.1969

(double-flowered forms); Orange district, *Downes NSW 116828*, 1.1969 (double-flowered form); Mt Canobolas, *Williams NSW 116788*, 11.1961; . . . NE. of Aylmerton, *Coveny 6458*, *Davies & Shanker*, 6.1975; Wombeyan Caves, *Wiburd NSW 116781*, 11.1936; Bowral, *Greenwood NSW 116784*, 9.1909; Moss Vale to Fitzroy Falls road, *Rodway NSW 146884*, 9.1952. SOUTHERN TABLELANDS: Tumut, *Macadam NSW 116779*, 8.1959. CENTRAL WESTERN SLOPES: Boorowa, *Chadwick NSW 116786*, 1.1933. SOUTH WESTERN SLOPES: Burrumbuttock, *McBarron* 1972, 9.1948.

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95	Pittosporaceae	144	Onagraceae
96	Cunoniaceae	145	Haloragaceae
97	Davidsoniaceae	146	Araliaceae
98	Rosaceae	147	Umbelliferae
99	Mimosaceae	148	Alangiaceae
100	Caesalpiniaceae	149	Ericaceae
101	<i>Papilionaceae, Part 1</i>	150	Epacridaceae
102	<i>Geraniaceae</i>	151	Myrsinaceae
103	Oxalidaceae	152	Primulaceae
104	Linaceae	153	Plumbaginaceae
105	Erythroxylaceae	154	Sapotaceae
106	Zygophyllaceae	155	Ebenaceae
107	Rutaceac	156	Symplocaceae
108	Simaroubaceae	157	Oleaceae
109	Burseraccae	158	Loganiaceae
110	Meliaceac	159	Gentianaceae
111	<i>Tremandraceae</i>	160	Menyanthaceae
112	<i>Polygalaceae</i>	161	Apocynaceae
113	Euphorbiaceae	162	Asclepiadaceae
114	Callitrichaceae	163	Convolvulaceae
115	Anacardiaceae	164	Polemoniaceae
116	Aquifoliaceae	165	Hydrophyllaceae
117	Celastraceac	166	Boraginaceae
118	Siphonodontaceae	167	Verbenaceae
119	Hippocrateaceae	168	Avicenniaceae
120	Stackhousiaceae	169	Labinatae
121	Icacinaceae	170	Solanaceae
122	Sapindaccae	171	Scrophulariaceae
123	Akaniaceae	172	Selaginaceae
124	Rhamnaceae	173	Bignoniaceae
125	Vitaceae	174	Pedaliaceae
126	Elaeocarpaceae	175	Martyniaceae
127	Tiliaceae	176	Orobanchaceae
128	Malvaceae	177	Gesneriaceae
129	Sterculiaceae	178	Lentibulariaceae
130	Dilleniaceae	179	Acanthaceae
131	Eucryphiaceae	180	Myoporaceae
132	Hypericaceae	181	<i>Plantaginaceae</i>
133	Elatinaceae	182	Rubiaceae
134	Frankeniaceae	183	Caprifoliaceae
135	Violaceae	184	Dipsacaceae
136	<i>Flacourtiaceae, with Supplement</i>	185	Cucurbitaceae
137	Passifloraceae	186	Campanulaceae
138	Cactaceae	187	Lobeliaccae
139	Thymelacaceae	188	Goodeniaceae
140	Lythraceae	189	Brunoniaceae
141	Rhizophoraceae	190	Styliadiaceae
142	Myrtaceae	191	Compositae
143	Melastomataceae		

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192	Lycopodiaceae	206	Adiantaceae
193	Selaginellaceae	207	Vittariaceae
194	Isoetaceae	208	<i>Davalliaceae</i>
195	Psilotaceae	209	<i>Grammitidaceae</i>
196	Ophioglossaceae	210	<i>Polypodiaceae</i>
197	Marattiaceae	211	<i>Aspidiaceae</i>
198	Osmundaceae	212	Athyriaceae
199	Schizaeaceae	213	Thelypteridaceae
200	Gleicheniaceae	214	Aspleniaccae
201	<i>Hymenophyllaceae</i>	215	Blechnaceae
202	Cyatheaceae	216	Marsileaceae
203	Dennstaedtiaceae	217	Azollaceae
204	Lindsaeaceae	218	Salviniaceae
205	Pteridaceae		

